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### Original Communications

#### A CONSIDERATION OF THERAPEUTIC ABORTION\*

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THE seriousness of abortion as an ever present problem, and factor in unnecessary puerperal mortality and morbidity, need hardly be reiterated. Thus Taussig says, "abortion is probably the most wasteful of known ills in its expediture of human life and human health."

Certain very special difficulties are involved in undertaking an attack upon this problem. And I shall not attempt a full consideration of it, with all its economic, sociologic, legislature and medical considerations. But it seems to me that most of us shy away from some of the obvious implications of the situation.

Our whole profession enjoys regarding itself as a highly moral and ethical group. We complacently assume that any individual who is admitted by scholastic attainment and satisfaction of legal requirement, into that group, is per se endowed with the honor and the high moral and ethical principles, which we like to think characterizes each one of us in our several attitudes toward our work.

We therefore, rather shamefacedly deplore the tremendous incidence of what we offhandedly characterize as "illegal" abortion with a more or less definitive implication that by far the larger number of such abortions are performed by nonmedical individuals, or by a small number of unworthy persons, who by some misadvertence, have been admitted into the sacrosanct ranks of those to whom proper moral and ethical standards in the practice of their profession has been providentially inborn in our own persons!

<sup>\*</sup>Read at a meeting of the New York Obstetrical Society, March 14, 1944.

My sole thesis is that we, as individuals and as a united profession, must maintain in our approach to this problem, a basic moral and ethical attitude. Whatever are our several divergencies of thought concerning it, all agree that only adherence to individual integrity of purpose will prevent the absolute degeneration of any system of remedial action advocated. Thus Rongy, one of the most radical American commentators says, "I have made certain of holding inviolate the dictates of conscience, both as a practitioner of medicine . . . and as a true believer in the ideals of liberalism," and says that he is deeply grateful that this combination has been possible for him. Thus he clearly implies the difficulty of most men in so holding conscience inviolate.

But an alarm clock cannot strike without being set to a definite time. The warning bell of conscience cannot ring without a definitive ethical standard to which it is geared. The importance of such a standard just at this time is emphasized by the statement that in connection with the accelerated war program of medical education, many individuals of less desirable moral calibre are likely to be admitted to our medical schools.

But were I today the graduate of any nonsectarian medical school in the country, what positive instruction would I have had at any point in my career as an undergraduate student which would tell me just whether and why I had any right to do abortions, and what constituted the right and wrong of such situations? In other words, what positive guidance would I have had as to the moral and ethical values involved in abortion?

I am afraid I would be very much at a loss. My several instructors would not have spent a great deal of time impressing these matters upon my embryonic medical mind. I would not, as such a new graduate in medicine, possess any strong bulwark against the temptation to indulge in the practice of abortion in a manner and to an extent which would make me a stench and a pariah in the opinion and estimation of the members of my chosen profession.

If one desired to inculcate any system of ethics, it would seem necessary to start with some very fundamental definitions and then to characterize acts done in violation of these definitions as unethical, and unlawful. Therefore, let us attempt a statement of clear, workable concepts. Abortion itself is sometimes defined as any termination of pregnancy prior to the natural termination of complete, or full-term, gestation. Such an all-inclusive definition, however, brings into indiscriminate consideration situations having no identity of moral significance. I shall accept a definition of abortion as "the termination of a previable uterine pregnancy; i.e., the expulsion or extraction of a live or a stillborn fetus before the seventh month (twenty-eighth week) of gestation," (Childrens' Bureau, U. S. Department of Labor), or the essentially identical phrasing proposed by Taussig as the legal definition,

"the destruction of the life of the child or its expulsion from the mother's womb, before it has become viable; that is, able to sustain life after its birth." It will be observed that these definitions express nothing as to the ethical propriety of abortion. And yet, unless there be some definition along moral lines, there can be no distinction whatever as between abortion which is legitimate and that which is not legitimate, or "criminal."

The common use of the phrase "criminal abortion" in literature and texts would imply that there was such a distinction between legitimate and illegitimate abortion in the law, and that we had only to turn to the law to receive the guidance which I am implying is desirable and salutary. Strangely enough, this is not so. The law in most of the jurisdictions of this country is based upon the old English common law. Under this law the unborn child, prior to quickening, has no entity, no legal existence, therefore no rights, therefore no possible violation of its rights, therefore no possibility of a crime against it whatsoever. From the standpoint of the fetus, there can be no crime involved in the destruction of its existence. In general this concept holds, and is embodied, in existing law in the several state jurisdictions in this country.

The laws of the several states do indeed contain restrictions as to the performing or procuring of abortions. Most of them contain exceptions designed evidently to permit its employment as a therapeutic procedure. The terms of such exceptions, however, are so astonishingly loose in the vast majority of cases as to actually constitute little deterrence. For instance, New Jersey law says, "any person who maliciously, or without lawful justification, with intent to cause or procure the miscarriage of a woman then pregnant with child, shall administer to her, prescribe for her, or advise or direct her to take or swallow any poison, drug or medicine or noxious thing; or who maliciously or without lawful justification, shall use any instrument or means whatever, with the like intent, shall be guilty of a high misdemeanor. . . . ". It will be noted that there is no definition of "lawful justification," nor any specification of the function of the physician in relation thereto. New York law forbids prescription, supplying, administering, advising, or causing a woman to take any medicine, drug, or substance, or using or causing to be used, any instrument or other means, with intent thereby to procure the miscarriage of a woman, unless the same is necessary to preserve the life of the woman, or of the child with which she is pregnant, and sharply increases the seriousness of the crime if the woman or her "quick child" dies. Here again, there is no specification of the basis of determination of the necessity for life salvage, nor restriction of the actual act to physicians.

Very few jurisdictions require that the determination of the necessity of abortion to save the mother's life must depend on medical men, or that the procedure when so determined, be carried out by medical

men. Only four jurisdictions recognize preservation of the mother's health as justifying abortion.

Mississippi exempts cases "advised by a physician to be necessary," without specifying the ground for such necessity, and with no restriction as to who may do the procedure.

The most specific laws are that of New Mexico, which makes attempted or actual abortion a felony "provided, however, an abortion may be produced when two physicians licensed to practice in the State of New Mexico, in consultation, deem it necessary to preserve the life of the woman, or to prevent serious and permanent bodily injury."

The District of Columbia makes the procurement of miscarriage of any woman unlawful, "unless when necessary to preserve her life or health, and under the direction of a licensed practitioner of medicine." This phraseology would apparently make it somewhat ambiguous as to whether the procedure actually has to be carried out by a licensed practitioner.

In Maryland the law provides "that nothing contained therein shall be construed so as to prohibit the production of abortion by a regular practitioner of medicine when, after consultation with one or more respectable physicians, he shall be satisfied that the fetus is dead, or that no other method will secure the safety of the mother."

If we cannot depend on the civil law for guidance as to ethical and moral principles involved, there must be that in the several codes of organizations like the American Medical Association and the American College of Surgeons to constitute a sufficiently definite and specific guide. If there are such, I have been unable to find them.

Yet certainly if in general the indiscriminate incidence of abortion of all types is a serious sociomedical problem, it becomes essential to adopt certain definitions based on secular ethical standards determined by the preponderance of opinion of the high-thinking members of our profession.

Of course it would be possible to find such ethical standards existent in the teachings of several religious bodies. It is not felt desirable however to resort to the direct teachings of any particular, or any several, such organizations. It is presumed that any ethical standards adopted by present-day medical or legalistic bodies would not lack the influence of organized religion on the background out of which such items of a moral code might arise. But it is unfortunate that there is enough difference in attitude between the several currently extant religious congregations, as to make specific religious teachings in respect to minutiae of doctrine, a difficult and insecure basis for approach to certain problems. In the present thought it is believed that the religious approach should be sedulously avoided.

What are the bases upon which one may erect an ethical standard to apply to this problem? It seems to me that they are very simple:

- 1. Physiologically, the unborn human being at any time after conception is an entity with all the potential life possibilities of any other creature.
- 2. It is entitled to the protection of those life potentialities as surely as is any other human being.
- 3. It is the duty of the profession to save and conserve human life. Effort to save human life however, must not deliberately and of itself jeopardize the life of another individual, nor even the same individual. One will recall numerous instances of the discussion of the propriety of particular operative procedures designed to directly save human life, the discussion revolving around the question as to whether an especially high immediate operative mortality-risk justifies the use of such procedure or not. In other words, it is recognized that it is not legitimate, even with the object of direct salvage of human life, to employ a means of therapy so formidable that its inherent risk is significantly large in relation to its potential salvage possibilities.

With these very simple basic considerations as the foundation for our ethical structure, the deliberate and intentional interruption of fetal life and growth is actually murder. If this is so, then abortion is never justified any more than any other murder is.

Child sums this up as follows: By common law the fetus in utero is not protected before quickening. But "Life is present from the time conception first occurs . . . the fetus is a living, independent being, has the right to exist which is common to all human beings, and is entitled to the protection of the State. . . . The direct taking of an innocent life is always murder . . . at whatever stage of existence it is committed."

But all religious and legalistic codes do admit that murder is sometimes justified. For instance, while the church of Jesus Christ cannot condone the mass murder which is war, it cannot be so unrealistic as to regard as a murderer every soldier who kills in war. Any individual, even under our modern laws, may kill an aggressor on his life, on that of one near and dear to him or, under some circumstances, a violator of his property rights, or an intruder on his domicile. Organized society in many jurisdictions reserves the right to murder convicted individuals as a preventive and punitive measure against certain crimes, especially murder itself.

But now note that all such so-called "justifiable" murder is surrounded by special safeguards as to the authenticity and factual reality of the circumstances attending it. History does not condone an act of war unless it be justified by actual hostile aggression.

Every circumstance relative to the basis of legal murder by execution is carefully scrutinized on the basis of a consensus of evidence and opinion *before* that murder is committed.

Where justifiable murder cannot be carefully considered beforehand, as when a policeman kills an assailant in alleged self-defense, the law insists on reviewing the circumstances afterward. If such review showed

that the *imminence of risk to his own life* did not justify the murder of his assailant, the killer himself may stand in jeopardy of punishment for destroying life without justification.

Is the murder which is abortion ever justifiable? The considered, honest opinion of many, probably a majority, of medical practitioners of high scientific attainment and unimpeachable moral character, is yes!

This opinion is based on the fundamental idea that under some circumstances the existence of pregnancy is a definite, direct and imminent jeopardy to the mother's life; that termination of the pregnancy is the only direct therapeutic resource to avert that jeopardy; and that therefore the murder of the fetus which such termination constitutes, is justified.

If this idea be valid, and such murder therefore sometimes justifiable, certainly it should be restricted in the same manner as is other "justifiable" murder.

First, like legal execution-murder, its justification must be determined, by careful weighing of the evidence, by more than one competent and competently authorized person. It is obvious, that for purposes of the highest justice, a maximum rather than a minimum number of such persons should participate in the decision.

Second, the evidence must show that the pregnancy threatens the life of the mother *imminently*. This question of imminence of lethal risk to the mother seems to me the crux of the consideration of the evidence. There is wide and increasing tendency to include in the evidence justifying abortion:

- a. Remote threat to the mother's life, and hence;
- b. Threat to the *health* of the mother. Thus Taussig repeatedly makes the plea for "broader indications for therapeutic abortion."

Such broadening of indication for justifiable or "therapeutic" feticide tends to practical removal of all deterrent to this practice. It is obvious that individual opinion as to "threat" to the mother's health may vary within the widest limits. In fact, it has been conceived that any pregnancy is a threat to the health of any woman. In other words, every pregnancy necessarily entails some inherent risks. If these risks be considered as "threats to the mother's health," there would be no bar to the induction of abortion in any pregnancy. But Lord Riddell, eminent British jurist quoted by Taussig, says, "a woman who becomes pregnant must be prepared to undergo the ordinary discomfort of pregnancy and to take the ordinary risks. Therefore, the practitioner must not be influenced by the abjurations of the patient to relieve her of these."

So much have these secondary considerations become acceptable as justifying "therapeutic" abortion, that we find in some of the outstanding obstetrical clinics in this country, they are actually being done in a proportion as high as almost 3 per cent of deliveries.

Table I. Incidence of Therapeutic Abortion in a Few Representative Clinics (Except Where Noted, From Official Reports of the Respective Institutions)

NAME	PERIOD	NO. ABOR- TIONS	NO. DE- LIVERIES	PER CENT	RATIO	
Johns Hopkins	1941 to 1942	55	1903	2.88	1:35	
Woman's Hospital, New York	1941	21	1798	1.20	1:85	
Bellevue	1942 to 1943	20	1712	1.16	1:86	
Sloane	1942	12	1744	0.69	1:145	
New York Lying-In*	1942 to 1943	43	6561	0.66	1:153	
Chicago Lying-Int	1931 to 1939	134	dest rate riser rase	0.51	1:195	
Margaret Hague Mater- nity Hospital	1931 to 1943	4	67000	0.006	1:16,750	

\*Personal communication, Dr. Gordon Douglas.

I very sincerely do not desire to impose on others the dictates which might appeal to my own conscience; nor to assert that abortion-murder is never justified. But I submit that in clinics charged with the primary duty of training undergraduate students of medicine there should be recognition of responsibility for inculcating the moral and ethical phases of that training. Where "therapeutic" abortion is so freely and frequently resorted to, there can hardly be any emphasis laid on the abhorrence of abortion in general. If it be part of the responsibility of such teaching clinics to establish in their students proper respect for the age-old ethics of medicine, they can hardly acquit themselves of this duty by slackening the standards by which they resort to abortion.

From our own experience I believe that by stricter adherence to the ethical basis I have tried to outline, and with a closer scrutiny of the so-called medical indications for abortion, the actual necessity therefor would be very much reduced.

Among the more common "indications" for "therapeutic" abortion are:

1. Hyperemesis Gravidarum.—This condition, where modern hospitalization and therapeutic resources are available, is almost always curable without abortion. In the last ten years we have treated 290 cases of this condition, of whom none has died, and one only has been aborted. This woman had had one previous pregnancy, 1936, during which there were two hospital admissions for hyperemesis, but she went to term and delivered a healthy 3,340 Gm. infant.

In her second pregnancy, 1939, she was again admitted at the fourth week with hyperemesis characterized by continuous vomiting, marked weight loss, persistent acetonuria, blood uric acid increased to 4.6, ieteric index 46.5, ieterus of sclera and skin, failure of improvement after two weeks' intensive treatment.

Therapeutic abortion by curettage at 6 weeks' gestation. Good re-

In her third pregnancy, 1940, she presented an almost precisely similar syndrome, complicated by severe gingivitis and parotiditis. She was discharged on her thirty-third hospital day, and at term delivered spontaneously a healthy 3,790 Gm. girl.

<sup>†</sup>Hesseltine, H. C., Adair, F. L., and Boynton, M. W.: Am. J. Obst. & Gynec. 39: 549. 1940.

In the light of her last experience, it may legitimately be questioned whether the abortion of her second pregnancy had been necessary.

- 2. Toxemia of Pregnancy.—While premature induction of labor is not infrequently necessary, this condition seldom occurs early enough in the course of pregnancy to necessitate consideration of therapeutic abortion as we have defined it. Our own experience would not lead us to believe that a mere history of prior acute pregnancy toxemia even in its gravest forms, justifies abortion of a succeeding pregnancy. Thus, of 153 women followed for varying periods up to 8 years who had suffered an original eclampsia, 90 had 143 subsequent pregnancies in the observation periods; the stillbirth rate was higher than the average, but in more than half the pregnancies, the women entirely escaped any degree of toxemia and only two had a repetition of eclampsia.
- 3. Fixed Hypertension.—Pregnancy in such cases presents the necessity for urgent consideration of abortion, for this condition not only spells certain imminent dangers in the course of pregnancy, but the pregnancy sometimes accelerates the malign course of the disease, and may thereby definitely shorten the mother's ultimate life expectancy.

But there must at least be careful individualization of each case. No ukase against the children of all hypertensive mothers may be indiscriminately applied. The most severe cases of this group generally abort spontaneously. Their life expectancy is so insecure that any general percentage probabilities applied to them would result in only inconsiderable differences in duration thereof.

On the other hand, Chesley's review of very carefully collected data in a large group over a considerable period of time indicates that approximately one-third of even these severe cases are not prejudiced by pregnancy in their subsequent condition and course. There are no criteria available for predetermining which individual will be so exempt from aggravation of her condition by pregnancy. We have observed numerous cases in which careful and prolonged hospital management has resulted in successful outcome of the pregnancy without apparent aggravation of the patient's condition. It is almost a certainty that more general application of properly prolonged medical treatment would greatly increase the proportion of these cases which could experience pregnancy with relative impunity. Much the same considerations apply to nephritis.

One of our four abortions was done in a patient who showed definite renal disease in one pregnancy, which she successfully completed. She almost immediately again became pregnant, showed even more severe and progressive renal involvement very early in the pregnancy, and was submitted to abdominal hysterotomy and bilateral salpingotomy at four months, with good immediate recovery.

Another of the cases in which we did resort to abortion and sterilization was a 37-year-old multigravida three months pregnant with a marked hypertension, heavy proteinuria and severe edema. She recovered, but remained permanently hypertensive as long as she could be followed.

The fourth case in our abortion series was a woman who had four pregnancies in 7 years, the first uncomplicated, the second characterized by severe pre-eclampsia, the third by severe pre-eclampsia with nephritis, the fourth by extreme hypertension and nephroselerosis. In each of the last three pregnancies in which we handled her, she reported

too late for us to prevent or control the toxemia. In each case pregnancy was terminated almost as soon as she came under observation. The last time, it was terminated at 14 weeks, thus coming under our defini-

tion of abortion, but she died shortly afterward of uremia.

It is thus seen that three of our four abortions were done for hypertension and/or nephritis. In one instance, it failed to avert death in a woman in whom repeated pregnancy manifestations of a probably consistently and rapidly progressive process had reached terminal seriousness. It is probable that prevention of her last two pregnancies might have prolonged her life. But it is certain that in her last experience, although her life was imminently threatened by disease, the abortion did not save her, nor could it probably have done so if employed earlier in that pregnancy.

4. Heart Disease.—In this disease our experience leads us to believe that in only the gravest cases; i.e., those of Type IV, in actual failure, is there justification for abortion. Such cases form only about 1.5 per cent of our cases. Any cases not in acute failure may be prevented, in almost 98 per cent of cases, by good management, from going into failure. The case in failure is of course, eminently not a fit subject for any surgical procedure. It may be conceived that very rarely a case seen in decompensation, early in pregnancy might justifiably be aborted after recovery of compensation, but here again, the risk of abortion must be weighed against that of recurrence of decompensation under good management. While our deaths from heart disease, like that of The New York Lying-in Hospital, are about 10 per cent of all our deaths, it is principally made up of cases admitted in decompensation following inadequate management either in our own or other hands. We have

not found it necessary to do any abortion for heart disease.

5. Pulmonary Tuberculosis.—No more bitter nor extensive controversy perhaps has ever raged than that over the question of the influence of pregnancy on pulmonary tuberculosis. Voluminous references may be adduced on either the radical or conservative side of the application of abortion in the tuberculous pregnant woman. But it may justly be said that the last decade has witnessed a very decided swing to conservatism. Two of the most recent reviews, one British, and one American, fall into this group. I am not prepared to offer any definitive conclusion from our own experience, because a study by Robert A. Cosgrove, of our own staff, and Alfred Kruger, of the staff of the Hudson County Tuberculosis Hospital, was interrupted by war exigencies. But it has been my conviction for many years that, crudely put, the tuberculous patient susceptible of arrest can stand pregnancy, she who will not arrest will not be seriously accelerated in her course by pregnancy. This is especially true since the more perfect evolution of the surgical means of controlling tuberculosis. These resources may all be applied as indicated, during pregnancy.

In all of these conditions adequately intensive and prolonged medical treatment of the medical cases which happen also to be pregnant, would result in little change caused by the pregnancy in the natural history of

the medical conditions.

Many other diseases complicated by intercurrent pregnancy will pose problems. In some, the urgency of surgical indication in the treatment of the disease per se, will necessarily and properly entail inevitable secondary sacrifice of a pregnancy.

In others, the dire and imminent threat to life incident in the disease itself gives primary impulse to rid the battling maternal organism of the

presumed embarrassment of pregnancy. Unfortunately, in such a circumstance, the performance of abortion all too frequently avails not at all in improving the prognosis. It may sometimes add a very direct danger of its own. For in spite of the unbelievably favorable statistics published from Russia, and the assertion of some authorities that abortion when properly done, is at least immediately innocuous, general experience indicates that such operations are not without considerable and direct risk in themselves. Thus, in one first-class American clinic 5.5 per cent of the therapeutic abortions died as a direct result of that procedure. Greenhill says, "We consider the operation of induced abortion one of the most dangerous in obstetrics."

The indirect risk of abortion in respect to numerous sequelae is part of all experience, and is significantly reflected in the vast experience of the Russians.

The confines of this paper do not permit discussion of the sociologic and economic phases of abortion. In what has been said above in relation to proper hospitalization and management of handicapped pregnant women there is, however, necessarily, implication of the necessity of increased socio-economic assistance to these folk. Such assistance therefore, becomes a primary necessity of any program for the control of the abortion evil.

#### Summary

- 1. The medical profession, from the nature of its work and obligations, is, and must continue to be, a highly ethical group.
- 2. A high sense of this ethical obligation must be thoroughly instilled in medical men during their undergraduate experience.
- 3. The responsibility for this ethical training resides in medical teaching facilities. This responsibility entails organized positive efforts toward its fulfillment.
- 4. Nowhere does this ethical sense have a more direct bearing than in relation to abortion.
- 5. Widespread and indiscriminate abortion is a major factor in puerperal mortality and morbidity, recognized by all medical and social students.
- 6. It is believed to be best controlled by retention of the ethical recognition that the fetus is a human individual with all the potentialities of every human being, and that its destruction is murder, only justifiable in the most extreme circumstances involving direct and imminent threat to the mother's life.
- 7. And that as a corollary, improvement in the whole situation must depend most importantly on the wide development of one of the Four Freedoms which is the goal of our national development, that of Freedom from want.
- 8. And, that in the preservation of the ethical sanctity of fetal life, and the development of this Freedom in all its phases, lies more hope of eventual betterment than a reversion to the amoral and unethical

plane of the most primitive and debased societies which has been exemplified with highly questionable success in Russian experience of the last two decades, and which has been essentially proposed by some thoughtful and sincere commentators amongst us.

9. And finally, that it is the duty of representative special medical bodies to formulate and supply a specific code for the ethical guidance of the members of our profession in relation to this problem.

Note: Appreciation is expressed for interest and help in the preparation of this essay to Leon C. Chesley, Ph.D., to Henry P. Wager, M.D., and to Dr. Benjamin J. Elwood, of the Hudson County Tuberculosis Hospital.

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#### Discussion

DR. MEYER ROSENSOHN.—Dr. Dickinson has made a very excellent plea: Shall we have the courage of our convictions in this matter of abortion? At the present moment, we are governed by the law and it is with this in mind that I would like to acquaint you with the law at this time and with the contemplated new law in New York State. There are two procedures to which the doctor doing an abortion is subject: One is the code of civil procedure which requires two consultants; and the penal code which lays down certain definite limits as to when an abortion can be done; this section of the penal code is now to be repealed. The new law, however, has not been passed as yet.

The contemplated law defines abortion and therapeutic abortion, and punishment of one who performs a nontherapeutic abortion. An abortion is the interruption of intrauterine pregnancy before the period of viability (up to 28 weeks of gestation) is reached.

A therapeutic abortion is the artificial interruption of an intrauterine pregnancy before the period of viability (up to 28 weeks of gestation) is reached where the continuance of such pregnancy would jeopardize the life of the woman or so aggravate the physical or mental disease from which she suffers as seriously to impair her health or threaten her life. It may be performed only by a physician duly licensed in the state of New York and only in a hospital recognized by the Department of Social Welfare of New York State, or the Department of Health of New York State, or approved by the American College of Surgeons and/or the American Medical Association, after written opinions as to its necessity have been obtained from two competent, qualified, and recognized consultants in the respective specialties involved, which said written opinions shall be incorporated in the records of the hospital.

A person who prescribes, supplies, or administers to a woman or advises or causes a woman to take any medicine, drug, or substance, or uses or causes to be used any instrument or other means with the intent of producing an abortion other than a therapeutic abortion as above defined, is guilty of a felony punishable by imprisonment in a state prison for not more than four years.

A person who as a consultant willfully makes a false or misleading certificate is guilty of a misdemeanor punishable by imprisonment for a term not to exceed one year and a fine not to exceed five hundred dollars or both for the first offense, and for a second and subsequent offense, such person shall be guilty of a felony punishable by imprisonment in a state prison for a term of not more than three years, or a fine not to exceed one thousand dollars or both.

As far as another objection which Dr. Cosgrove brought out about the entity of the offspring from the moment of conception is concerned, I believe that in California there is a decision that the child immediately after the moment of conception may inherit; in other words, the child is an entity. The case in point was where an inheritance was left to be divided among children and grandchildren and it was a question whether a share of this was to go to this offspring conceived a week or month before the death of the maker of the will. The court ruled the child was an entity and as such entitled to inherit.

DR. WILLIAM E. STUDDIFORD.—I have been somewhat responsible for the therapeutic abortions performed at Bellevue Hospital in the last ten years. Since I note that the incidence as given by Dr. Cosgrove is moderately high, I would like to say a few words in regard to these cases. I believe that, on the whole, we feel very much as Dr. Cosgrove does. On the other hand, we are a little more inclined to widen our indications. In regard to the specific indications that Dr. Cosgrove mentioned, I do not recollect any case being terminated at Bellevue Hospital in the last ten years with a diagnosis of hyperemesis. We have seen very few of such cases and those that we have seen have responded very readily to treatment.

In regard to the terminating of pregnancy in patients with a history of toxemia of pregnancy, we have to specify the variety of case we are talking about. It depends a great deal on whether it is a fulminating variety coming on with great rapidity toward the end of pregnancy and disappearing completely following the termination of pregnancy. Many of these cases do not do that. They come on earlier and the condition is present for several weeks before the pregnancy reaches term. We all know that these cases are very apt to be followed by hypertension, albuminuria and that they may recur and become worse in subsequent pregnancies and eventually impair the health of the mother. When such a background is present, further pregnancies are contraindicated.

The question of heart disease is a difficult one to settle. I think that every one of us feels that the cardiac patient who has had two or three children is better off if she does not have more children. Nevertheless, the Heart Association of New York City, has studied this very point; they have gathered together a large group of rheumatic cardiac patients who have gone through pregnancy and a similar group who have not, and they found that the average expectation of life in these patients is the same whether they have been pregnant or not.

In regard to pulmonary tuberculosis: in the last ten years we have been extremely conservative, especially in patients who have been brought to our attention after the third month of pregnancy. Most of these patients have been allowed to proceed with pregnancy and we have seen very few serious exacerbations of the disease as a result of allowing them to proceed.

We have been apt to include in the consideration of our indications for therapeutic abortion not only the patient's medical condition, but her surroundings and her social and economic status. If the conditions are favorable, we are inclined to allow her to continue, if not, we are more inclined to recommend termination of the pregnancy.

DR, GEORGE W. KOSMAK.—I feel like resenting somewhat the course which this discussion has taken.

In the minds of most of us I believe there is no doubt at all about the indications for therapeutic abortion which Dr. Cosgrove has outlined. These therapeutic abortions were done under the best possible conditions and with definite indications.

The abortion evil which has stimulated the passage of the bill referred to, does not constitute the crux of this situation at the present time. It is not the therapeutic abortion which bothers us so much as it is the criminal abortion. All the indications that Dr. Cosgrove outlined and which have been referred to by the other speakers are, I believe, generally accepted by the profession and in doing abortions for these conditions and on ethical grounds the legal requirements are probably pretty closely followed. But all these therapeutic abortions are not a "drop in the bucket" as has been indicated compared to the large number of other abortions which are done. I therefore resent Dr. Cosgrove's implication that therapeutic abortions, in a sense are "murders"; I think that is stretching the point a bit. However, I believe that most of the abortions that are done by the so-called professional abortionists are "murders." These professional abortionists have no altruistic

view as regards their work; they are doing it purely for the financial gain which comes to them and, therefore, we should be very careful in our discussion to bear this in mind. I think doctors as a class are thoroughly aware of the underlying factors which Dr. Cosgrove has so well outlined before they undertake abortions, but none of these factors is taken into consideration by the men who do these procedures merely for financial gain; therefore, I cannot quite agree with Dr. Dickinson that that type of abortion should be made a reason, if you might call it so, for any study of their methods because I do not believe that the profession as a whole would agree to be governed in its own procedures by the different tricks that these professional abortionists may have been able to put over.

DR. HOWARD C. TAYLOR, JR.—I think we are overlooking the extraordinary scientific experiment which Dr. Cosgrove has carried out in conducting a service with as low an incidence of therapeutic abortion as he apparently has succeeded in doing. It is not a case of having fewer therapeutic abortions than any of these other services to which he has referred, but being in an entirely different class from any other, as judged by his statistics.

I would like to ask whether in his opinion after this experience there were indications that should have been considered in addition to the four which he mentioned. I should like to be reassured that he believes there have been bad results in none of his mothers from reducing the incidence of therapeutic abortion to as low a point as he has been able to do.

DR. CLAUDE E. HEATON.—Dr. Cosgrove has presented us with a problem which as he points out is not only medical, but raises the question of ethics, morals and law.

So far as legality is concerned, people of integrity sometimes oppose a law impelled by motives which are entirely honest. Laws will not solve the problem of abortion.

What power is going to decide our morals, our ethics? The state? The church? If the latter, what church? A careful survey was made in an eastern industrial city: forty-one per cent of the group studied had no church affiliation at all. The faith of our fathers emphasized the individual's conscience. As reputable doctors we may safely follow the dictates of our own conscience when faced with the problem of abortion.

We, in this country believe the state derives its authority from the consent of the governed; we do not believe in a totalitarian state. Dr. Cosgrove rightly pleads for a change in society which will place the family on a firmer economic footing. Finally, in our attitudes toward the matter of abortions, there is all too often considerable downright hypocrisy.

DR. SAMUEL A. COSGROVE.—I would reciprocate Dr. Dickinson's kind personal expressions; I would express myself as most appreciative of the tremendous amount of work which he has done on abortion and many related subjects and testify to the utter honesty of his approach, the utter altruism of the self-sacrificing work that he has offered to the profession. I would also say that I willingly concede that he probably knows a good deal more about abortion than I do. I think, however, that most of his discussion was hardly pertinent to the paper because I was not discussing particularly the abortion evil. My only approach to the abortion evil was that unless we, in our application of definitive principles in our use of abortions which we consider legitimate, are absolutely careful and conscientious, we have no fountain head from which to approach any system of control of the whole abortion evil. I hope I have made that viewpoint clear. Inasmuch as I have tried to indicate the desirability and propriety of our application of an ethical standard for our work, I do not think that the testimony of profes-

sional abortionists is particularly applicable. I might take issue with some of his remarks. I do not think that illegitimate pregnancy necessarily always implies complete physical and psychical harm to the mother. He says that the law forbids us to see the experts work; maybe that is a good thing. He speaks of the refusal of organized medical bodies to investigate the work of professional abortionists. Well, we have twenty years of Russian experience. I won't take the time to read what appears to be the latest summary of the American viewpoint of the results of that vast Soviet experience, but it is available to you in the bibliography which will be published with the paper and was well exemplified in an editorial in the J. A. M. A. as long ago as eight years. It throws enough light on the broad results of indiscriminately applied abortion without the necessity of investigating the work of professional abortionists here. I sympathize with him in his attitude on the removal of the stigma of illegitimacy. Certainly we have no right, society has no right, to stigmatize the illegitimate child. It is an encouraging social indication that several states, including my own and I think New York and Pennsylvania, have removed the recorded stigma of illegitimacy from the transcripts of their birth certificates.

Dr. Rosensohn spoke of the proposed new law in New York. Clarification, as indicated by him in the new law, is badly needed because the present law is entirely indeterminate in the specification of the manner of determining the legitimacy of abortion. Of course, in regard to the California decision which he quoted and which recognized the entity of the earliest conceptions, that merely means that is one of the jurisdictions which has not in the past followed the old English common law workings; it is an instance of modern physiology rather than ancient legal concepts.

I was astonished to hear Dr. Aranow say that the medical profession was not concerned with determining ethical standards. Who is going to determine standards for us if it isn't ourselves? And since when does the medical profession not need to recognize ethical standards?

DR. HARRY ARANOW.—I meant ethical standards of taking human life—abortion. I was talking about whether or not it is legitimate for us to take human life.

DR. COSGROVE.—That is an important item in the ethics of medicine, and my plea tonight is for the profession to be specific in its own definition of its ethics and let the law follow it; let us guide the law and not be hidebound by the law.

The moment, however, that you permit social and economic considerations to enter the question of abortion, that is, legitimate medical abortions, you open the doors almost without any restraint at all. Because while you and I might estimate in any particular case that such and such a social and economic status justified abortion, the next person might admit just a little broader indication and the next fellow a still broader indication. Each man's estimation might be just as legitimate as ours. I think it is particularly dangerous to base our procedure on anything except purely medical necessities.

I am quite willing to admit at the present time that under some circumstances compromise may be necessary, but it must be recognized as a compromise and the compromise eliminated as promptly as possible and the profession should aim toward the ideal where such compromise will not be necessary.

DR. WILLIAM E. STUDDIFORD.—Are you speaking of the possibility of such a case being heard by a board on which you have representative sociologists, economists and a doctor?

DR. COSGROVE.—I was not thinking too specifically of that. Public funds can be used to avert starvation, as they are being used in this country and have been

used for the past decade or longer; those funds could similarly and just as legitimately be used for the alleviation of the socio-economic conditions which you and Dr. Watson speak of.

DR. STUDDIFORD.—If we are to absolve ourselves from such conditions I think we must have other people decide them for us.

DR. ROBERT L. DICKINSON.—Do we not in every medical condition take the economic conditions into consideration? In every other thing we are asked to do so. In abortion we throw them out.

DR. COSGROVE.—I don't know that that is very largely so, Dr. Dickinson. Pneumonia, for example, has to be treated properly. It is too bad if money stands in the way of that treatment, and in anything approaching a decent society, money should not be permitted to stand in the way of it.

Dr. Studdiford spoke of fixed hypertension and nephritis. I think my paper indicated that if there is any legitimate indication for therapeutic abortion it is in that type of case. However, if prolonged medical treatment and hospitalization were applied to all of those, certainly the number that would have to be aborted would be tremendously reduced.

Dr. Kosmak says I should not talk of murder. I diametrically disagree with him on that. I acknowledge the possibility of justifiable murder as I clearly enough outlined in my paper. If I admit the occasional justification of murder, certainly he should not balk too much at my calling abortion what it actually is, murder, premeditated destruction of human life.

Dr. Taylor's is a legitimate question, and I am frank to say, I cannot answer it. There have been occasional cases which, on review, I would concede had been better aborted. I believe that those cases are very rare; however, I have not searched our records for material with which to specifically answer that question.

I am surprised, however, to hear Dr. Loizeaux say that the decision in cardiac cases is up to the cardiologist. On my service, it is understood that the obstetrician should not be a mere mechanic to carry out the direction of a specialist in another field; he has the same right that any practitioner has to seek consultation, and then to evaluate that counsel in his own judgment and make the final decision himself. I think there is altogether too great a disposition for the obstetrician to merely carry out the orders of this or the other specialist.

DR. LEON S. LOIZEAUX.—We have to have the opinion of a ranking man in that department. We have difficulty in arguing about those cases if they come to us with a recommendation from the specialist. Sometimes it is obvious that they are right, and sometimes it is obvious that we are wrong.

DR. COSGROVE (closing).—I think Dr. Burns' report of a death from hyperemesis antedated the more modern treatment and that he would not have lost that patient today.

I am glad Dr. Heaton appreciated that some of the discussers seemed to miss the whole point of the paper and he properly questions by what authority a standard for our guidance shall be erected. I have argued tonight as the whole point of what I have been trying to say that we should not depend on legal or religious or any other authority; that we ourselves, on the basis of our own conscience evolve our own standards and be our own authority for the standards that we seek to follow.

### THE RELATION OF BASAL METABOLIC GAIN DURING PREGNANCY TO NONPREGNANT BASAL METABOLISM

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CTUDIES of basal metabolism during normal pregnancy have clearly I shown that a rise occurs during the late months of pregnancy. This rise generally averages around 15 per cent.1-3 Yet there is a great deal of individual variation. Some women have a basal gain of 30 per cent or more during gestation while others show an actual decline in rate. Aside from possible experimental errors, there are probably many factors which might influence the degree of rise. An individual developing a hydramnios would not be expected to show an increase of oxygen consumption commensurate with her weight increase. Edema increases weight without a corresponding increase in oxygen need. Patients who acquire excessive adipose tissue during pregnancy might perhaps show a lesser percentage rise in basal metabolism. Richards and Newberry4 have shown that women with more active fetuses have greater increases in basal rate, perhaps due directly to oxygen needs of their energetic fetuses. Small women with large fetuses should have large rises. One factor of possible importance in determining the degree of pregnancy rise might be the state of function of the thyroid gland during nonpregnancy. We shall present here a study of the relationship between pregnancy basal rise and nonpregnant basal level. Our question is, do women with low nonpregnant basals show a large, a small, or an average rise during gestation?

#### Methods and Results

At the Fels Research Institute, we have had under careful observation nearly two hundred pregnant women.<sup>5</sup> A part of our observation has consisted of basal metabolic rate determinations, at the end of each trimester, or at monthly intervals, and twelve months postnatally. The indirect method was used. The frequency of the tests insured absence of apprehension and good cooperation. All tests were done in duplicate, and the lower of the two results was used, unless there was obvious reason to believe it inaccurate. The normal standards used in calculating results were those of Boothby, Berkson and Dunn.6 The research subjects were all "normal" women selected upon the basis of their willingness to cooperate, but without regard to previous basal rate. Basal gain was calculated by subtracting post-partum rate from ninth month rate. From the entire group we eliminated: (1) Those patients upon whom either ninth month or a post-partum basal was not available; (2) those with severe dyspnea or other difficulty, whose tests were technically unsatisfactory; (3) those with toxemia or other systemic condition which might affect basal rate; (4) those with toxic goitre. Data on the remaining 158 women constitute the material for this study.

The correlation coefficient (Pearsonian) between pregnancy basal gain and nonpregnant basals is -.62. From this figure it is evident that in our group those women who had the lowest nonpregnant basal metabolic rates tended to have the greatest pregnancy gain. This correlation coefficient is great enough to be highly significant. Yet the

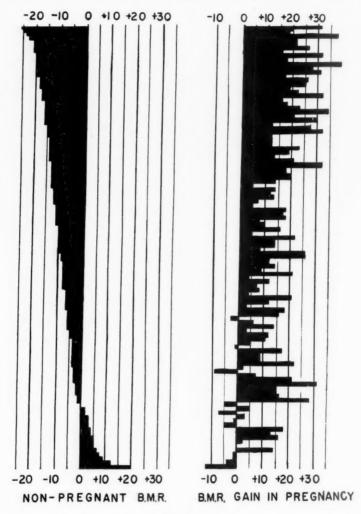


Fig. 1.

fact that it is not -1.0 indicates there are exceptions to the relationship it expresses. Fig. 1 shows the relationship graphically. From this figure it is evident that the preponderance of high basal gains occurred among the women with the lowest nonpregnant basals, but that there are several exceptions.

Table I contains the means and standard deviations of nonpregnant, ninth month pregnant, and pregnancy gains in Basal Metabolic Rate for our group.

TABLE I

B.M.R. CLASSIFICATION	NO.	MEAN	STANDARD DEVIATION
Nonpregnant B.M.R.	115	-8.33	9.7
B.M.R. in ninth month of pregnancy	158	+5.89	8.5
B.M.R. gain during pregnancy	142	14.27	10.8

Table II shows the distribution of values for nonpregnant and ninth month pregnant basals and basal gains during pregnancy.

TABLE II. DISTRIBUTION OF VALUES FOR THREE B.M.R. CLASSIFICATIONS IN THE FELS INSTITUTE SERIES

PER CENT	NONI	PREGNANT	NINTH MONTH		PREGNANCY GAIN	
PER CENT	NO.	PER CENT	NO.	PER CENT	NO.	PER CENT
Plus 36 te 40					2	1.9
Plus 31 to 35					8	7.5
Plus 26 to 30			2	1.9	7	6.5
Plus 21 to 25			$\frac{2}{1}$	0.9	14	13.1
Plus 16 to 20	1	0.9	9	8.4	19	17.8
Plus 11 to 15	1	0.9	16	15.0	21	19.6
Plus 6 to 10	3	2.8	22	20.6	11	10.3
Plus 1 to 5	10	9.3	25	23.4	12	11.2
0	1	0.9	8	7.5	1	0.9
Minus 1 to 5	18	16.8	18	16.8	9	8.4
Minus 6 to 10	25	23.4	5	4.7	2	1.9
Minus 11 to 15	23	21.5	1	0.9	1	0.9
Minus 16 to 20	18	16.8				
Minus 21 to 25	6	5.6				
Minus 26 to 30	1	0.9				

Our values for basal gain correspond very closely with those of other investigators.1, 2 Our nonpregnant basal values are low on the basis of the Boothby, Berkson and Dunn standards. Davis7 has published a study of basal metabolism determinations on pregnant and nonpregnant women in Milwaukee, Wisconsin, and Wilmington, Delaware. His mean values are also notably below the standards he used, presumably again the Boothby, Berkson and Dunn standards. A comparison of his figures with ours (Table III) shows that our values for nonpregnant basals are even lower than those of his Milwaukee group.

TABLE III. A COMPARISON OF NONPREGNANT B.M.K. DISTRIBUTION IN THE SERIES WITH THE MILWAUKEE AND WILMINGTON WOMEN STUDIED BY DAVIS A COMPARISON OF NONPREGNANT B.M.R. DISTRIBUTION IN THE FELS

	B.M.R. ABOVE PLUS 10%	B.M.R. IN NORMAL RANGE	B.M.R. BELOW MINUS 10%
Fels nonpregnant series	1.8%	53.4%	44.8%
Milwaukee series (Davis)	16.7%	52.4%	30.9%
Wilmington series (Davis)	5.5%	50.0%	44.5%

Boothby, Berkson, and Dunn, in presenting their norms for basal metabolic rate, very carefully explain that their figures are derived from tests on Mayo Clinic cases. They are done without benefit of practice. Since the metabolism tests were a part of the total diagnostic procedure of the Clinic and were done on medical patients seeking diagnosis and treatment, they may have been influenced by an element of anxiety. Since the environment and circumstances surrounding the testing of Davis' patients and also our series were very different, and since in both series there was a good deal of practice, we may perhaps

assume that these elements are responsible for a considerable degree of the difference between the Mayo series and Davis and ours.

Table IV compares Davis' late pregnancy basals with our ninth month basals.

Table IV. A Comparison of Ninth-Month B.M.R. Distribution in the Fels Series With the Wilmington Late Pregnancy Group Studied by Davis

	B.M.R. ABOVE	B.M.R. IN	B.M.R. BELOW
	PLUS 10%	NORMAL RANGE	MINUS 10%
Fels ninth month pregnancy series Wilmington late pregnancy series (Davis)	26.2% 6.0%	72.9% 62.0%	0.9% $32.0%$

Despite the fact that our nonpregnant group has basals comparable to Davis' Wilmington group, our ninth month group has a higher mean basal rate than Davis' late pregnancy group. Perhaps this fact may be accounted for his inclusion of seventh and eighth month basals in his late pregnancy group, whereas our tests are all made during the ninth month.

The degree of difference between Davis' and our nonpregnant basals and those which comprise the Mayo Clinic standards suggests at once the need for interpreting the results of any basal metabolic test in terms of the conditions under which it was made. It is probably not justifiable to assume that because our basals or those of Davis are lower than those of the Mayo Clinic group, that hypothyroidism is more highly prevalent in Milwaukee, Southern Ohio or Delaware, although of course such might be the case. It seems more reasonable to assume that since the women upon whom we made our tests were people who had been collaborating for periods of months or years in our research program here, since they did not come for diagnosis but rather to undergo a routine part of our research procedure, and since in most instances they had had considerable opportunity for practice in the recording of a basal metabolic rate, that they suffered from a minimum degree of apprehension. Their complete familiarity with the technique and their lack of apprehension about themselves and what the results of the test might yield, give a more nearly basal set of values than are represented in the Mayo Clinic group. From basals taken under such conditions, we should perhaps be very hesitant in interpreting a basal result of minus 15 or minus 20 on the basis of the Mayo standards, as indicating hypothyroidism. For the average hospital or clinician, the Mayo standards are far more valid than any derived from data such as ours.

#### Discussion

There probably is some adequate physiologic explanation for the tendency shown in Fig. 1, for mothers with low nonpregnant basals to score the greatest gains in basal rate during pregnancy. Three possible explanations occur to us and are perhaps worth stating.

1. It is generally accepted that individuals with inadequate thyroid function are more sensitive to a small dosage of desiceated thyroid substance than are persons with normal thyroid function. It is usually easier to produce a rise in basal metabolic rate in a hypothyroid individual by thyroid therapy, than it is in a normal individual by the

same therapy. If then the fetal thyroid contributes an important share to the total fetal-maternal thyroid economy, the maternal system should respond with a greater increase in metabolic rate if a hypothyroidism existed than it should if that maternal system had a normally functioning thyroid. In other words, the fetal thyroid would correspond to more effective thyroid therapy if a hypothyroidism existed in the mother.

- 2. The fetal thyroid, like the fetal pancreas in a diabetic mother, may be capable of expanding its output to compensate for maternal deficiency and by so doing strive to produce a state of optimum maternal fetal thyroid function. Such a mechanism would permit a maternal system with low thyroid function to attain the same optimum state of metabolism as would occur with a normal maternal and average fetal thyroid.
- 3. It is possible that the physiologic changes of pregnancy provide a resurgence of function of the maternal thyroid. Thus, for the period of pregnancy, it may become a normally functioning gland and in doing so cause a greater than average basal gain over the nonpregnant state.

The exceptions to the low nonpregnant basal-high gain finding may involve many factors such as weight gain, size of the fetus, deviations in functions of the other glands, etc. For example, in our group there is a correlation coefficient of +.22 between basal gain and weight of the This figure, while low, is significant at the .05 level of reliability. From this figure one may presume that a small fetus from any cause might be expected to influence toward a lower figure the mother's basal gain. More difficult to explain, however, are those not infrequent cases where an actual decline in basal rate occurs during pregnancy. In these instances, it is perhaps reasonable to assume that a less adequate food iodine intake in late pregnancy, lessened emotional stress, glandular or other factors were at the time of pregnancy in the process of lowering the metabolic level; or that some process during the period when the nonpregnant basal was taken had raised it above its "normal" level. Certainly if the pregnancy drop had been due to failure of development of the fetal thyroid, the child from such a pregnancy would have been cretinous, and such was never the case in our series.

#### Summary

The relationship between the nonpregnant basal metabolic level and the basal metabolic gain during pregnancy was investigated in 158 women of the Fels Research Institute series.

Women who had the lowest nonpregnant basal metabolic rates tended to have the greatest pregnancy gains. Possible explanations of this finding, as well as a discussion of the exceptions which occur, are presented.

In the Fels nonpregnant series, 44.8 per cent of the women had basal metabolic rates below -10 per cent on the basis of the Mayo Clinic

standards. Basal metabolic rates during the ninth month of pregnancy were preponderantly at the level which would usually be considered normal for nonpregnant women. These facts can probably be explained on the basis of differences in the conditions under which various basals are measured.

The low basal metabolic rates observed in the Fels series were compared with Davis' Milwaukee and Wilmington series, which also showed low values. The possible need for interpretation of test results in terms of the environment, significance the patient attaches to the test, general anxiety, and previous test experience is suggested.

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#### MEASUREMENT OF THE CYCLIC VARIATIONS IN THE QUAN-TITY OF CERVICAL MUCUS AND ITS CORRELATION WITH BASAL TEMPERATURE\*

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SéGUY and Vimeux¹ were among the first to report cyclic changes in the amount of cervical mucus in normally menstruating women. They found that the amount of mucus is greatly increased from about the tenth to the fifteenth day after the beginning of the last menstrual period. At this time the mucus is glairy, transparent, and relatively acellular. In a later paper Séguy and Simonnet² correlated this phenomenon with an increase in urinary folliculin and with visual evidence of ovulation by inspection of the ovaries at laparotomy.

Lamar, Shettles and Delfs<sup>3</sup> confirmed and extended these observations. In addition to studies on the amount and viscosity of the cervical mucus, they found that spermatozoa can penetrate the mucus to an appreciable distance only during this period of increased secretion and during menstruction.

Basal body temperature curves have been used for estimating the time of ovulation. Reviews of the literature on this subject can be found in the reports by Barton<sup>4</sup> and Lyon.<sup>5</sup> According to current interpretations the vaginal temperature is maintained at a relatively low level during the follicular phase of the cycle, rises abruptly following ovulation and remains at this higher level throughout the progestational phase of the cycle. The temperature drops with the onset of the next menses or within a day or two preceding the actual onset of bleeding. Ovulation is considered to have occurred between the time of the last low and the first high temperature. Women having anovulatory cycles, castrates, children and men do not show these biphasic curves.

Various investigators have correlated basal body temperature with other signs of ovulation such as electric potential shifts,<sup>4</sup> endometrial biopsies,<sup>6</sup> basal metabolic rates,<sup>7-9</sup> sodium pregnanediol glucuronidate, gonadotropin and estrogen excretions,<sup>10</sup> and vaginal smears.<sup>7, 10-11</sup>

The amounts of mucus present in the cervix as reported in the literature have been estimated by the observers merely as small, moderate, or large. It has been felt by the present authors that a more objective measurement might be of value and to that end the following data have been obtained. Since the basal body temperature shift is believed by many to be a fairly reliable method for fixing the time of ovulation,

<sup>\*</sup>Aided by a grant from the Johnson & Johnson Research Foundation, New Brunswick, N. J.

it was thought that a study of the time relationship between basal temperature changes and the quantity of cervical mucus might prove interesting.

#### Material and Methods

A dry speculum was inserted to expose the cervix. If the vaginal secretion grossly contaminated the cervical mucus at the external os, an attempt was made to wipe it away with a cotton swab. This usually resulted in a slight loss of cervical mucus due to the tenacity of the latter. It was necessary to follow this procedure only occasionally.

A weighed glass cannula was then inserted a few millimeters into the external os and the mucus was withdrawn by aspiration with an attached 20 c.c. syringe. An attempt was made to evacuate the canal completely, using a second cannula if necessary. The cannulae were again weighed and the amount of mucus was determined by difference.

Daily temperatures were taken vaginally in the morning before arising using a clinical thermometer graduated to 0.2 of a degree Fahrenheit. The thermometer was left in place for five minutes before taking the reading and subjects were instructed to estimate the temperature to the nearest 0.1 of a degree.

Four nulliparous married women were used as subjects.

Subject 1.—Aged 25, was followed through six consecutive cycles which were 27, 25, 26, 27, 25 and 27 days long respectively. The menstrual history and physical examination were normal. Except on Sundays and holidays, she was examined daily between 9 and 10 A.M. In a number of instances during the first four cycles, she was examined again at about 12 o'clock, or between 3 and 4 P.M. During cycles 5 and 6 single daily mucous specimens were obtained. During the first four cycles, the subject used a diaphragm as a contraceptive followed by a douche the next morning. No contraceptives were used in the last two cycles but a douche was taken the morning following intercourse.

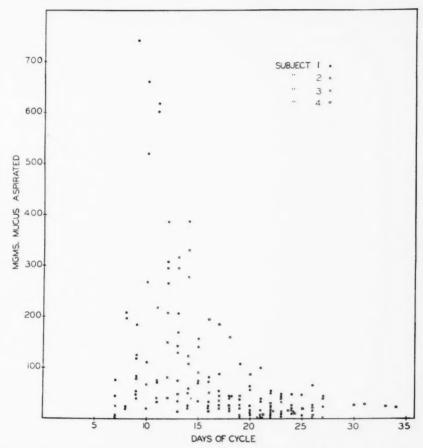
In some instances even 8 or 9 hours after a douche, the material obtained by aspiration was abundant in amount, quite transparent, and of low viscosity regardless of the day of the menstrual cycle. When seen again the following day at the usual time, the findings were again those representative of the peroid in the cycle. In other instances, the use of a douche did not seem to alter the amount and characteristics of the mucus to be expected for that particular day of the cycle, but to avoid introducing any variable error, all specimens obtained on days when a douche was taken are excluded from the data.

Subject 2.—Aged 26, was followed through three nonconsecutive cycles of 26, 27 and 27 days respectively. The menstrual history and physical examination were normal. Mucous specimens were obtained once daily except on Sundays and holidays with the exception of the second cycle when the subject was ill with a minor intestinal disorder during days 13 through 18. Oral temperatures taken on these days were normal so the vaginal temperature curve also has been considered normal. As a contraceptive, the subject used a diaphragm followed by a douche the next morning. For the same reasons as discussed under Subject 1, specimens obtained on these days are not included in this report.

Subject 3.—Aged 20, was followed for one complete cycle of 27 days. In the next two cycles because of mild upper respiratory infections only a few scattered observations were made. The menstrual history and physical examination were normal. This subject also used a diaphragm

as a contraceptive and followed this by a douche the next morning. same procedure was carried out with her as with Subjects 1 and 2.

Subject 4.—Aged 25, was followed through three consecutive cycles. The first two were 34 and 29 days long, respectively, and pregnancy occurred in the third cycle. The menstrual history and physical examination were normal. This subject was anxious to become pregnant and used no contraceptives at any time. Inasmuch as the effect of the semen



Relation between the amount of cervical mucus and the time in the menstrual role. One hundred fifty-one observations in 14 cycles of 4 individuals.

on the cervical mucus might very probably introduce a variable error in the consideration of normal values, specimens obtained on the days following intercourse were not included. For this reason very little data were obtained from about the fifteenth through the twentieth days of the cycles. Data obtained after the twentieth day of cycle 3 are not included because of pregnancy.

#### Results

The amounts of cervical mucus obtained throughout all the menstrual cycles of the four subjects are shown in Fig. 1. A total of 151 observations were made, 72 for Subject 1, 30 for Subject 2, 23 for Subject 3, and 26 for Subject 4. It can be seen that the amount of mucus is increased from about the eighth through the eighteenth days considering the group as a whole. If the individuals are considered separately, the peaks are from the eighth through the thirteenth days for Subject 1, the twelfth through the fifteenth days for Subject 2, the tenth through the fifteenth days for Subject 3, and the sixteenth through the eighteenth days for Subject 4. The reason for a later peak in this case is readily explainable on the basis of her longer cycles.

In general, there seems to be a level of about 60 mg, or less, both preceding and following the days of increased secretion. The greatest amount of mucus, 741 mg, in a single observation, was obtained in Subject 1. This is about a twelvefold increase over the secretion at other times in the cycle. This subject consistently secreted more mucus during the peak than any of the others. In the other individuals the maximum amount varied from about 200 to 400 mg.

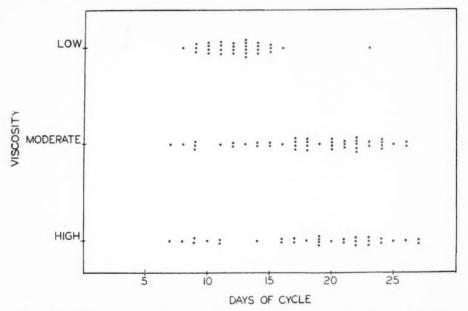


Fig. 2.—Relation between the viscosity of cervical mucus and the time in the menstrual cycle. One hundred seven observations in 10 cycles of 4 individuals.

Subjects 1 and 4 were aspirated twice daily during part of this study; the first aspirations were made at 9 a.m. and the second at about 12 noon, or at 3 to 4 p.m. Typical findings are shown in Table I. In 52 out of a total of 59 instances the second aspiration, whether made at noon or later yielded a slight but significantly greater amount of mucus than the first. In two instances, the amount was the same at both aspirations, and in five instances, the second aspiration yielded less than the first. There are several possible explanations for this phenomenon. One is that during the night when the individual is at rest, less mucus may be produced. Coincident with increased bodily activity upon arising, the rate of secretion may be increased. Another possibility is that since the individual has been lying in a horizontal position for some 8 or 10 hours, the mucus may have accumulated at the uterine end of the cervical canal. It might be that a vertical position after arising may

facilitate drainage of the mucus which has been retained. Since the first aspirations were made approximately two hours after arising and the second some five or more hours after arising, more of the mucus might reach the external os later in the day. This problem is being studied in greater detail at the present time.

No objective method for measuring the viscosity of cervical mucus has as yet been found. During the course of this work it has been estimated as high, moderate or low by observing the ease with which the mucus could be drawn up into a small glass capillary of approximately 0.4 mm. inside diameter. The results of 107 observations in 10 cycles are shown in Fig. 2. The viscosity is usually low from the eighth through the sixteenth days of the cycle if the group is considered as a whole. The range of low viscosity for any one cycle is usually only 4 or 5 days. Only at one observation was a low viscosity encountered after the sixteenth day, namely on the twenty-third day. The reason for this atypical instance is not known. Our results are in general accord with those obtained by Lamar et al.3

TABLE I. THE AMOUNTS OF CERVICAL MUCUS OBTAINED WHEN CERVIX IS ASPIRATED TWICE DAILY

	FIRST ASPIRATION	SECOND A	SPIRATION
DAY OF CYCLE	9 то 10 л.м.	12 NOON	3 TO 4 P.M
	MG.	MG.	MG.
8	53	71	
9	41	67	
10	272	389	
12	201		185
13	86		58
14	47		62
15	38		104
16	43		40
17	29	59	
19	19	49	
20	14	45	
21	16	42	
22	13	24	
23	10	40	
24	20	33	
26	33		36
27	10		34

Basal vaginal temperatures were recorded and correlated with the amount of cervical mucus through a total of 7 cycles. In order to best illustrate these observations, the results are shown by individual cycles in Fig. 3. Correlations between temperature and the amount of cervical mucus were studied in cycles 3 through 6 in Subject 1. Using the temperature shift as the criterion, ovulation presumably occurred between the thirteenth and fourteenth days in cycles 3 and 4, and between the twelfth and thirteenth days in cycles 5 and 6. In each eyele the maximum secretion of cervical mucus preceded the temperature rise by at least one day, and in one instance, cycle 5, by three days. Penetrability studies done in cycles 3 and 4 according to the method of Lamar et al.,3 indicated that the optimum conditions for penetration of the cervical mucus by spermatozoa existed days 11 through 13. Coitus without contraceptives on the fourteenth day of cycle 6 did not result in pregnancy. The patient reported in a follow-up visit that in the next succeeding cycle coitus on the thirteenth and fourteenth days did not result in pregnancy either. While repeated exposures often

transpire before pregnancy results, it is interesting to speculate whether for this particular individual impregnation would be more probable if intercourse had taken place on days 11 and 12 when the optimal conditions for impregnation may have existed.

Data from three nonconsecutive cycles are available for Subject 2. Because of illness in cycle 2, as mentioned previously, it was not possible to correlate the temperature with the amount of mucus. In cycle 1, the subject experienced definite midmenstrual pain in the afternoon and evening of the thirteenth day. The temperature on the fourteenth day was 1.9 degrees higher than the low on the preceding day. The temperature did not remain this high but fell to a level averaging 0.7

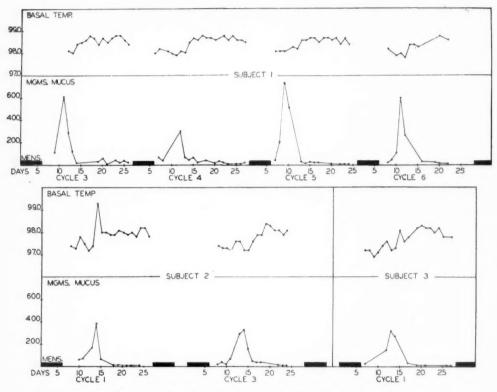


Fig. 3.—Relation between the amount of cervical mucus and the basal temperature. Seven cycles of 3 individuals.

degrees higher than the prethermal shift average. The maximum secretion of mucus coincided with the time of the temperature rise, i.e., on the fourteenth day. The amounts of mucus on days 13 and 15 were 200 to 300 mg., less than the peak of about 400 mg., certainly a significant difference. This is the only cycle of the seven studied in which the temperature shift and maximum secretion of mucus occurred on the same day.

In cycle 2, where only the temperature record is available, midmenstrual pain again occurred on the thirteenth day. On the fourteenth day, the temperature reached a peak of 99.1 degrees, a rise of 1.7 degrees.

In cycle 3, no midmenstrual pain was experienced and no significant peak was obtained in the temperature record, although a moderate rise was observed. Ovulation presumably occurred between the fifteenth and sixteenth days, while the maximum secretion occurred on the thirteenth and fourteenth days. Here, as in Subject 1, the maximum secretion preceded the temperature rise. This individual used contraceptives throughout the cycle so no data are available concerning the possibility of impregnation.

In Subject 3, correlation between temperature shift and the amount of cervical mucus was obtained in one cycle. The temperature shift came between the fourteenth and fifteenth days, and the maximum secretion of cervical mucus was from the twelfth through the fourteenth day, with the peak on the thirteenth. Here again, the maximum

secretion occurred shortly before the temperature shift.

In Subject 4, temperatures were recorded only during the last cycle, i.e., the one which terminated in pregnancy. The temperature rise came between the sixteenth and seventeenth days which correlates well with the fact that her cycles were 29 to 34 days long. No specimens of mucus uncontaminated by semen were available for days 15 through 18 but the amounts aspirated during these days were definitely larger than those obtained under similar circumstances during the latter half of the cycle. This would seem to indicate that the maximum secretion probably occurred during those days.

The vaginal temperatures for this subject remained high beyond the date of the expected menses, and a Friedman test done on the thirtyfourth day after the beginning of the last menstrual period was positive. The pregnancy has since been confirmed clinically. This persistence of an elevated basal temperature beyond the date of the anticipated menses, i.e., in early pregnancy, is in accord with the findings of

others. 11-14

Vaginal smears and smears of cervical mucus taken daily and stained by the method of Shorr<sup>15</sup> were studied in this laboratory, but we were unable to discern from them definite changes that could be correlated with the exact time of ovulation.

#### Discussion

Our results are in agreement with those of Séguy and Vimeux<sup>1</sup> and of Lamar, Shettles and Delfs3 that cervical mucus undergoes cyclic variations in amount. In addition, we have weighed the mucus obtained by aspiration instead of estimating it subjectively. The amounts of cervical mucus we have aspirated do not represent the total secretion per 24 hours. However, the subjects were seen at approximately the same time each day so we feel that the variations between aspirations are significant.

From the small series of cycles presented here showing the time relationship between the amount of cervical mucus and the basal temperature, it is evident that in these normal individuals the maximum secretion of cervical mucus usually precedes the temperature rise. This may be the explanation for the fact that in Zuck's series<sup>12</sup> some individuals having coitus after the temperature rise failed to become pregnant.

A study covering the time relationship between the amount of cervical mucus, the basal temperature, and planned pregnancies resulting from single exposures would be highly interesting, but so far an adequate supply of clinical material has not been available.

A study of the cyclic variations in the amount of cervical mucus and their relation to basal temperature in cases of unexplained sterilities might be profitable. One such individual, who menstruates regularly and who has had the usual sterility investigation, was followed through four cycles. The temperature curves indicated that ovulation was probably not occurring. The cervical mucus increased in amount near the expected time but the viscosity remained high. The injection of estrogens did not lower the viscosity. Obviously the cause of the sterility is related to the failure to ovulate in this case.

We feel that by the procedures used in this study, the presence or absence of ovulation can be detected with as much accuracy as by endometrial biopsies or by prolonged hormone studies. There is no discomfort to the patient, the tedious procedure of collecting urine specimens is avoided, and no special equipment is needed.

#### Summary

- 1. The amount of cervical mucus that can be aspirated daily throughout the menstrual cycle has been measured quantitatively.
- 2. About 60 mg, or less is obtained from the end of the menstrual period to about the eighth or ninth day of the cycle. The amount then increases markedly for about 4 days. The peak of maximum secretion varies from about 200 to 700 mg., depending upon the individual observed. The secretion then falls abruptly to the previous level of 60 mg. or less, and remains there throughout the rest of the cycle.
- 3. In six of seven cycles where the time relationship between the amount of cervical mucus and the basal temperature was observed, the maximum secretion preceded the rise in temperature by one to three days. In the seventh cycle, the maximum secretion and the temperature shift occurred on the same day.
- 4. It is suggested that similar studies be applied to cases of otherwise unexplained sterility.

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# THE MANAGEMENT OF DELIVERY IN PREGNANCY COMPLICATED BY SERIOUS RHEUMATIC HEART DISEASE

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ANY obstetrical institutions consider cesarean section the safest method of delivery in pregnancy complicated by serious rheumatic heart disease. Several authors have recently commented upon the high maternal mortality following cesarean section performed because of heart disease, and have questioned the indication in such poor surgical Gorenberg and McGeary<sup>1</sup> report a mortality of 6.9 per cent following abdominal delivery as compared to 1.2 per cent following vaginal delivery. Gorenberg<sup>2</sup> states that heart disease is no indication for cesarean section. Greenhill3 claims that there is practically no necessity to resort to cesarean section when the sole indication is rheumatic heart disease. Hamilton and Thomson<sup>4</sup> report mortalities of 8.3 per cent and 2.3 per cent, respectively, for abdominal and vaginal deliveries. They also find a higher incidence of cardiac failure, embolism and sepsis following abdominal delivery. However, none of the above authors has presented acceptedly similar vaginal and abdominal groups to warrant comparison of methods of delivery.

The trend toward cesarean section for rheumatic heart disease was, in part, a reaction to the high mortality noted when cardiac patients were induced into premature labor with the expectation of obviating further increase in the circulatory burden. In the light of more recent knowledge, spontaneous improvement toward term is now anticipated, and such interference is generally contraindicated. The trend to cesarean section was also due to lack of criteria for evaluating the heart during labor.

In previous studies we attempted to find a practical method of evaluating the intrapartum cardiac status. In a series of normal women,<sup>5</sup> it was observed that the pulse and respiratory rates remained practically unchanged throughout the first stage of labor. Certain increases in these rates were noted with the advent of bearing-down efforts in the second stage.

Two hundred cases of pregnancy complicated by rheumatic heart disease were next studied.<sup>6</sup> The ante-partum functional capacity diagnoses according to the New York Heart Association criteria were: 72 Class 1, 109 Class 2, 17 Class 3, and 2 Class 4. One patient was delivered by cesarean section and the remainder were delivered vaginally. There were no deaths in the entire series. Intrapartum or post-

partum cardiac failure occurred in 3 per cent of the two hundred cases, none of whom had ever previously decompensated. Elevation of the pulse rate above 110 with elevation of the respiratory rate above 24, or such elevation of the pulse rate alone during the first stage of labor preceded each instance of cardiac failure by sufficient time to afford ample warning of its approach. No instance of cardiac failure occurred in patients with pulse and respirations below these critical levels during the first stage of labor regardless of the severity of the cardiac condition as indicated by the ante-partum functional classification. Rises in pulse and respiratory rates similar to those in normal women were observed during the second stage of labor but no serious significance could be attached to such rises unless they were preceded by similar first-stage values. We were particularly impressed with the outcome in bad cardiacs. Stress was laid upon good ante-partum care, functional evaluation, observation of the pulse and respiratory rates intrapartum, adequate digitalization and shortening of the second stage of labor. If similar results were obtained in a larger series, labor would be less formidable.

#### Present Study

There have been 41,459 pregnancies at the New York Lying-in Hospital from 1932 through 1943. Table I shows that pregnancy was complicated by rheumatic heart disease in 1,089 cases or 2.6 per cent. Table II shows the functional capacity distribution of cases according to the New York Heart Association criteria. The present study was undertaken primarily to evaluate the methods of delivery in serious rheumatic heart disease (Class 3 and Class 4). Table III shows there were eleven deaths in the 1,089 patients giving a total mortality of 1 per cent, but only eight or 0.7 per cent were due to the heart condition. These eight cardiac deaths were described in Table IV; all were due to decompensation—five ante partum and three post partum. The five ante-partum deaths occurred at the following months of pregnancy: one at the fifth, one at the sixth, two at the seventh, and one at the ninth. Two patients had been discharged from the hospital following recovery from a previous episode of cardiac failure. The three postpartum deaths followed abdominal delivery—one after hysterotomy and two after cesarean section.

TABLE I. INCIDENCE OF PREGNANCY COMPLICATED BY RHEUMATIC HEART DISEASE AT THE LYING-IN HOSPITAL

Pregnancies, 1932 to 1943	41,459
Pregnancies, 1932 to 1943 with rheumatic heart disease	1,089
Incidence of pregnancy complicated by rheumatic heart disease	2.6%

TABLE II. FUNCTIONAL CAPACITY IN PREGNANCY COMPLICATED BY RHEUMATIC HEART DISEASE

Class 1—480—44%	
Class 2—442—41%	
Class 3—113—10%	
Class 4— 54— 5%	

TABLE III. MATERNAL DEATHS IN RHEUMATIC HEART DISEASE

Deaths in 1,089 patients	11-1.0%
Cardiac deaths	8-0.7%
Other deaths	3-0.3%

TABLE IV. CARDIAC DEATHS IN PREGNANCY COMPLICATED BY RHEUMATIC HEART DISEASE

CASE	AGE	PAR- ITY	GRAV- IDITY	LESION	ANTE- PARTUM FUNC- TIONAL CLASSI- FICA- TION	CAR- DIAC EN- LARGE- MENT	REMARKS
DIED UN	NDELIV	ERED					
1	28	0	2	MI. MS, AI	3	+	Death due to failure at fifth month
2	35	0	1	MI. MS	3	+	Death due to failure with bronchitis at sixth month
3	23	0	1	MI. MS	3	+	Failure at sixth month, dis- charged after recovery, death due to failure at term
4	31	1	2	MI. MS, AI, AS	3	+	Death due to failure at seventh month
5	21	0	1	MI. MS	3	+	Failure at fifth month, dis- charged after recovery, death due to failure at seventh month
DIED PO	ST PAR	TUM					
6	40	3	5	MI. MS	3	+	Failure at fifth month, cesa- rean section with tubal li- gation under drop ether at term, death first day due to failure
7	25	0	1	MI. MS	3	+	Failure at fifth month with auricular fibrillation, cesarean section with tubal ligation under drop ether at eighth month, death eleventh day due to failure after febrile course with bronchopneumonia  Failure at fifth month with auricular fibrillation, cesarean section with tubal ligation under local at sixth
8	38	1	2	MI. MS	3	+	month, death twelfth day due to failure after afe- brile course complicated by peripheral emboli

Table V shows the three deaths not attributable to the heart condition. These patients had less serious heart disease according to the functional capacity (Class 1 or Class 2) and at no time did they show any evidence of cardiac failure. One died ante partum of nephritis with uremia, and two died post partum of severe hemorrhage.

Table VI shows the type of delivery according to functional capacity. Forty-five patients were delivered abdominally with three deaths as previously described giving a mortality of 6.7 per cent. One thousand thirty-eight patients were delivered vaginally with no deaths. A comparison of mortalities would be of little significance if only the most

Table V. Noncardiac Deaths in Pregnancy Complicated by Rheumatic Heart Disease

CASE	AGE_	PAR- ITY	GRAV- IDITY	LESION	ANTE- PARTUM FUNC- TIONAL CLASSI- FICA- TION	CAR- DIAC EN- LARGE- MENT	REMARKS
DIED UN	NDELIV	ERED					
1	28	0	2	MI. MS	2	0	Death due to nephritis with uremia at seventh month
DIED PO	ST PAR	TUM					
2	29	1	2	MI. MS	1-2	0	Death 11 hours post partum due to shock from 1,300 c.c. hemorrhage following normal delivery under gas-oxygen-ether after 4-hour la- bor at term. Normal pulse and respiratory rates throughout la- bor, no evidence of cardiac failure
3	32	0	1	MI. MS	1.2	0 "	Death 2 hours post partum due to shock from 1,000 c.c. hemorrhage following difficult midforceps with cervical and sulcus lacerations. Prolonged labor 80 hours with normal pulse rate throughout and no evidence of cardiac failure. Gas-oxygen-ether for delivery

TABLE VI. TYPE OF DELIVERY ACCORDING TO FUNCTIONAL CAPACITY

	CASES DELIVERED	CLASS 1	CLASS 2	CLASS 3	CLASS 4
	1,083	480-44.0%	441-41.0%	113-10.0%	49- 5.0%
ABDOMINAL	45- 4%				
Hysterotomy	9	2- 0.4%	2- 0.5%	3- 2.7%	2- 4.1%
Cesarean section	36	5- 1.0%	10- 2.3%	8- 7.1%	13-26.5%
VAGINAL	1,038-96%				
Spontaneous abortion	50	24- 5.0%	21- 4.8%	5- 4.4%	0-0
Therapeutic abortion	54	0.0	24- 5.3%	30-26.5%	0-0
Viable delivery	934	449-93.6%	384-87.1%	67-59.3%	34-69.4%

serious cardiacs were delivered abdominally. Further analysis will therefore be concentrated upon the Class 3 and Class 4 cases.

Table VII shows the indications for the forty-five abdominal deliveries. Nineteen cases were in Class 1 or Class 2, and operation was performed without fatalities for indications other than the heart condition. Twenty-six cases were in Class 3 or Class 4 and there were no indications for operation apart from the severity of the cardiac disease. The twenty-six cases consisting of five hysterotomies and twenty-one cesarean sections are completely analyzed in Table VIII. Table IX shows the yearly distribution of these cases. The three deaths in this group have already been described in Table IV. Only one of three patients with auricular fibrillation survived abdominal delivery. This patient was a forty-three-year old para iv, gravida v

Table VII. Indications for Abdominal Delivery in Pregnancy Complicated by Rheumatic Heart Disease

A—Abdominal delivery in Class 1 or Class 2 rheumatic heart disease performed for indications other than the cardiac condition	19
contracted pelvis 5, elderly primigravida 3, previous vaginal plastic 2, nephritis 2, previous cesarean section 2, breech 1, cervical dystocia 1, chorea 1, relative sterility 1, advanced arthritis 1  Deaths	
B—Abdominal delivery performed because of Class 3 or Class 4 rheumatic heart disease  Deaths 3	26

TABLE VIII. ABDOMINAL DELIVERY BECAUSE OF CLASS 3 OR CLASS 4
RHEUMATIC HEART DISEASE

	HYSTEROTOMY-5		CESAREAN SECTION-21	
	CLASS 3	CLASS 4	CLASS 3	CLASS 4
Number of cases	3	2	8	13
Deaths	0	1	0	2
Auricular fibrillation	0	1	0	2
Cardiac enlargement MI. MS.	3	2	8	13
Cardiac enlargement MI. MS. AI, AS.	0	0	1	1
Cardiac enlargement MI. MS. AI.	0	0	1	2
Primipara	1	0	4	6
Multipara	2	2	4	7
Normal pelvis	3	2	8	13
Age 35 or over	1	0	3	5
Elderly primigravida	0	0	1	1
Adequate digitalis	2	2	8	13
General anesthesia	3	1	4	10
Local anesthesia	0	1	4	3
Elective classical operation	3	2	8	13
Post-partum hemorrhage	0	0	0	0
Tubal sterilization	0	1	7	12
Cardiac failure before pregnancy	0	1	0	4
Cardiac failure ante partum		1		9
and post partum		1		2
		123456789	Month	123456789
Month of ante-partum failure		1	Cases	13122
Cardiac failure intrapartum		0		0
Cardiac failure post partum		0		0

Table IX. Abdominal Delivery Because of Class 3 or Class 4 Rheumatic Heart Disease

YEAR	TOTAL CASES	HYSTEROTOMY	CESAREAN
1932	18	0	0
1933	101	0	7
1934	79	0	2
1935	106	0	1
1936	99	1	2
1937	116	0	4
1938	125	0	2
1939	78	0	2
1940	75	1	1
1941	95	1	0
1942	98	1	0
1943	99	1	0
		02	_
	1,089	5	21

with a double mitral lesion and cardiac enlargement. She had severe cardiac failure at the seventh month of pregnancy, recovered and was delivered at the eighth month under local anesthesia by elective classical cesarean section with tubal ligation. There was no excessive blood loss and recovery was uneventful.

Let us now turn to the 1,038 patients with rheumatic heart disease delivered vaginally with no fatalities. One hundred thirty-six were in

TABLE X. VAGINAL DELIVERY IN CLASS 3 OR CLASS 4 RHEUMATIC HEART DISEASE

	ABORTION-35		VIABLE BABY—101	
	CLASS 3	CLASS 4	CLASS 3	CLASS 4
Number of cases	35	0	67	34
Deaths	0	0	0	0
Auricular fibrillation	3	0	1	3
Cardiac enlargement MI. MS.	35	0	67	34
Cardiac enlargement MI. MS. AI. AS.	2	0	6	1
Cardiac enlargement MI. MS. AI.	2	0	4	6
Primipara				
spontaneous	2	0	9	3
operative	7	0	21	10
average duration labor				17 hours
Multipara				
spontaneous	3	0	24	14
operative	23	0	13	7
average duration labor				10 hours
Average weight of babies				3,440 Gm.
Normal pelvis	30	0	60	33
Age 35 or over	1	0	25	4
Elderly primigravida	0	0	3	2
Adequate digitalis	3	0	30	34
General anesthesia	32	0	58	22
Local anesthesia	3	0	4	8
No anesthesia	0	0	5	4
Post-partum hemorrhage	0	0	6	1
Average measured blood loss				170 c.c.
Tubal sterilization	0	0	4	1
Prolonged labor 30 hours or over			8	2
Cardiac failure before pregnancy	0	0	0	7
Cardiac failure ante partum				21
and intrapartum				8
and post partum				1
			Month	123456789
Month of ante-partum failure			Cases	2414 10
Cardiac failure intrapartum				5
Cardiac failure post partum				1

TABLE XI. SUMMARY OF ABDOMINAL AND VAGINAL DELIVERY IN CLASS 3 AND CLASS 4 RHEUMATIC HEART DISEASE

	ABDOMINAL	VAGINAI
Number of cases	26	136
Cardiac enlargement MI. MS.	26	136
Cardiac enlargement MI. MS. AI	3	12
Cardiac enlargement MI. MS. AI. AS.	2	9
Auricular fibrillation	3	7
Primipara	11	52
Multipara	15	84
Age 35 or over	9	30
Elderly primigravida	2	5
Adequate digitalis	24	67
General anesthesia	18	112
Local anesthesia	8	15
Postpartum hemorrhage	0	7
Severe cardiac failure (Class 4)	15	34
Deaths	3	. 0

Class 3 or Class 4. Thirty-five had abortions and one hundred one had viable deliveries. The cases are completely analyzed in Table X. Table XI summarizes the significant data in the abdominal and vaginal groups.

#### Discussion

One is impressed by the low mortality in this large series. The results are primarily due to good ante-partum care. All patients with organic or suspected heart disease are referred to a special cardiac clinic where those with organic heart disease are classified according to the New York Heart Association criteria. Exercise tolerance and vital capacity tests not infrequently belie a favorable history. We have found the functional capacity very valuable in management and prognosis. Hamilton and Thomson4 prefer to classify patients as "favorable" or "unfavorable" and find that 18 per cent originally classified as "favorable" change to "unfavorable" during the course of pregnancy. They conclude that "any cardiac may fail at any time" and recommend following all cardiac patients at weekly intervals throughout pregnancy. We have found no such instability of patients classified according to the New York Heart Association criteria, and we believe the vast majority of Class 1 and Class 2 will go through pregnancy and labor without cardiac difficulty. Accordingly, these cases may be seen in the special cardiac clinic at three- to four-week intervals during the first two trimesters. Any patient more serious than Class 2, or with a history of previous decompensation is admitted to the hospital for study, and early pregnancy may be interrupted if indicated. If the pregnancy is allowed to continue, the patient is either discharged to be carefully followed in the cardiac clinic and later readmitted as indicated, or in some instances, she is kept in the hospital under constant supervision. It is important to note that two of the five ante-partum cardiac deaths occurred after discharge from the hospital following recovery from failure. Such cases should remain under observation in the hospital for the duration of pregnancy. The data indicate the danger of failure begins about the fifth month. Eight (15 per cent) of the fifty-four Class 4 patients died.

The notion that severe cardiacs have a higher than normal incidence of spontaneous abortion or premature labor has led some to expect the patient to solve her own problem. In a previous study Stander<sup>7</sup> has shown that "cardiac disease in the mother does not increase the loss in offspring by increasing either the ratio of spontaneous abortions or the infantile mortality. The term "infantile mortality" includes all stillborn and deadborn babies weighing more than 1,500 grams as well as those babies dying during the first two weeks of life. The only way in which cardiac disease may affect the infant loss is indirectly through the number of therapeutic abortions performed because of the cardiac disease." In the present series of the one hundred thirteen Class 3, and fifty-four Class 4 patients, the incidence of therapeutic abortion was 18 per cent, and that of spontaneous abortion was 4 per cent. The incidence

of therapeutic and spontaneous abortion in the total clinic population is 0.8 per cent and 5 per cent, respectively. Furthermore, it is noteworthy that there were no spontaneous abortions in the Class 4 patients, or those with auricular fibrillation. The average weight for the viable babies delivered vaginally of Class 3 and Class 4 patients was 3,440 grams, whereas that for the total clinic population is 3,428 grams.

In the cardiac clinic, emphasis is laid upon sodium and fluid restriction, adequate rest, treatment of anemia and upper respiratory infection. Oppel<sup>8</sup> has shown the importance of anemia and upper respiratory infection as precipitating causes of failure. Any Class 3 patient with a serious upper respiratory infection is admitted to the hospital for observation and treatment. Class 3 patients are generally admitted to the hospital several weeks prior to the expected date of confinement for evaluation and digitalization as indicated. Exercise tolerance tests may precipitate cardiac failure and they are not performed indiscriminately.

The present study of one hundred sixty-two Class 3 and Class 4 cardiacs who were delivered shows a mortality of 12 per cent following abdominal delivery as compared to zero following vaginal delivery. All the abdominal operations were of the elective classical type without hemorrhage. There were five hysterotomies with one death (20 per cent), and twenty-one cesarean sections with two deaths (9.5 per cent).

There was nothing in the histories of the abdominal group which would necessarily make them appear as the most serious cases. There can be no doubt of the severity of the vaginal group which included thirty-four Class 4 cases, and seven with auricular fibrillation. The data also indicate that abdominal delivery has been performed with decreasing frequency in Class 3 and Class 4 patients. Yet, there is certainly no justification for the statement that hysterotomy or cesarean section should never be performed for rheumatic heart disease. There are patients with advanced mitral stenosis who grow progressively worse and die undelivered in spite of all therapeutic measures. The five ante-partum cardiac deaths in this series still present a challenge in the problem of management and perhaps abdominal delivery might have averted the fatal outcome. It should be emphasized that each patient has to be individualized regarding treatment. Complications such as cephalopelvic disproportion, dystocia labor, placenta previa, etc., resolve themselves primarily into obstetric problems and should be so treated. But barring such obstetric indications for cesarean section, the vast majority of cardiac patients are allowed to go into labor spontaneously. It seems that premature interference adds to the existent circulatory burden which is generally greatest between the fifth and eighth months of pregnancy.

The present study does show quite clearly that Class 3 and Class 4 patients can be successfully delivered by the vaginal route. When indicated, vaginal therapeutic abortion is a relatively safe procedure for interruption of early pregnancy. Hysterotomy apparently carries a

definite risk. The hazards of labor can be definitely reduced with good ante-partum care, careful functional evaluation, adequate digitalization, and shortening of the second stage. The pulse and respiratory rates intrapartum provide a valuable guide to the cardiac status. Any patient with cardiac enlargement and a pulse rate above 110 per minute and respiratory rate above 24 per minute, or with such elevation of the pulse rate alone during the first stage of labor should be rapidly and completely digitalized. She should be kept upright in bed, given oxygen, and delivered as soon as feasible after full cervical dilatation to avoid the bearing-down efforts of the second stage. The upright position should be maintained during delivery. Analgesia during labor is used as indicated, but excitement and restlessness are avoided. The choice of drugs depends largely upon the progress of labor.

The data do not support the belief that severe cardiacs have relatively short labors. The average duration of labor in the Class 3 and Class 4 cases was seventeen hours for primigravida and ten hours for multigravida. These values are not significantly different from those in normal women (eighteen hours and twelve hours, respectively) considering that about 50 per cent of the Class 3 and Class 4 cardiacs were delivered by forceps at the end of the first stage of labor. Furthermore, the incidence of prolonged labor in the Class 3 and Class 4 cardiacs was 10 per cent, whereas that for the total clinic population is 9 per cent.

The present study does not corroborate the statement that cardiac patients have a greater than normal blood loss at parturition. The average measured blood loss at delivery in the Class 3 and Class 4 patients was 170 c.c., whereas that for the total clinic population is 247 c.c. We have been favorably impressed with the use of pudendal block for delivery. There is less bleeding with local anesthesia than with open drop ether. Despite the early favorable comment regarding caudal anesthesia, we have not chosen to add the risk of this method to that already existent in the patient.

The avoidance of puerperal infection is always stressed since the damaged heart valve is a locus minoris resistentiae for development of subacute bacterial endocarditis. A program of prophylactic sulfonamide therapy during labor and the puerperium is under way with this end in view.

Such a regimen as outlined above requires all the skill and niceties of medical and surgical obstetrics, and only when these are available should one feel justified in assuming the responsibility for pregnancy complicated by serious rheumatic heart disease.

#### Summary

A series of 1,089 patients with pregnancy complicated by rheumatic heart disease is presented. This complication occurred in 2.6 per cent of 41,459 pregnancies. The functional capacity diagnoses according to the New York Heart Association criteria were: 480 (44 per cent) Class

1, 442 (41 per cent) Class 2, 113 (10 per cent) Class 3, and 54 (5 per cent) Class 4.

The total mortality was 11 (1 per cent), and the cardiac mortality 8 (0.7 per cent). All cardiac deaths were due to decompensation five died undelivered, and three died following abdominal delivery.

The Class 3 and Class 4 cases are completely analyzed. Twenty-six were delivered abdominally with 3 deaths (12 per cent). One hundred thirty-six were delivered vaginally with no deaths. The abdominal group consisted of 5 hysterotomies with 1 death, and 21 cesarean sections with 2 deaths. The vaginal group consisted of 35 abortions and 101 viable deliveries.

Cardiac failure occurred after the fourth month, and 15 per cent of these cases died.

An outline for management of pregnancy complicated by serious rheumatic heart disease (Class 3 and Class 4) is presented.

## Conclusions

- 1. The successful management of pregnancy complicated by serious rheumatic heart disease requires a program of medical and surgical obstetrics of the highest order.
- 2. Barring other obstetric complications, the vast majority of cases can be successfully delivered by the vaginal route.
- 3. When indicated, vaginal therapeutic abortion is a relatively safe procedure for interruption of early pregnancy.
- 4. The hazards of labor can be definitely reduced with good antepartum care, careful functional evaluation, adequate digitalization and shortening of the second stage. The pulse and respiratory rates intrapartum provide a valuable guide to the cardiac status.
- 5. Abdominal delivery has been performed with decreasing frequency, yet it may still have its place in those patients who fail to improve in spite of treatment.
  - 6. Each patient should be evaluated as an individual problem.
- 7. Once severe cardiac failure has occurred ante partum, there is a great risk in discharging the patient from the hospital before delivery.
- 8. The incidence of spontaneous abortion and premature labor, the duration of labor and the blood loss at parturition in women with serious rheumatic heart disease are not significantly different from values in normal women.

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# BACTERIOLOGIC AND CLINICAL ASPECTS OF GONORRHEA IN THE FEMALE\*

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# Section I: Bacteriologic Aspects

A STUDY of gonorrhea in the adult female was initiated by the Gonococcus Research Unit of the Department of Health, City of New York, in October, 1942. This study was deemed necessary because of the belief that the control of gonorrhea in general, depends to a great extent, upon effective control of gonorrhea in the female. The aims of the study were, therefore, to evaluate and improve the methods of diagnosis and the criteria of cure in current use, and to determine the effectiveness of various methods of therapy.

Two agencies participated in this study; (a) The gynecological service of Bellevue Hospital; and (b) the clinic and laboratory of the Gonococcus Research Unit, Department of Health, City of New York.

The present report which covers a period of nine months, is concerned mainly with observations on hospitalized patients, many of whom were subsequently followed up at the clinic of the Research Unit. Patients for this study were selected by the members of the staff of the gynecological service, on the basis of a suggestive history, or suspicious clinical symptomatology, or both. A few cases with a diagnosis of gonorrhea were referred by the clinic of the Department of Health.

For the purpose of simplifying the analysis of the numerous problems involved in this study, it was decided to divide this report into two separate sections. The first part deals with the bacteriologic aspects of female gonorrhea, while the second part evaluates clinical features.

During the course of the routine bacteriologic examinations of 230 female patients, the following problems came under consideration: the relative merits of smears and cultures in the diagnosis of gonococcal infections in the female; the limitations of smears and cultures and a reevaluation of bacteriologic examination of operative gynecological specimens.

#### Bacteriologic Diagnosis

Collection of Material.—All patients were examined bacteriologically by smear and culture taken according to the procedure recommended by

<sup>\*</sup>This investigation was aided by a grant from the United States Public Health Service.

the American Neisserian Medical Society. Smears and cultures were taken from both the urethra and cervix at each examination.

Smears.—Smears were usually examined first so that the smear diagnosis would be uninfluenced by the culture results. A smear was considered gonococcus positive if intracellular gram-negative diplococci of typical appearance and arrangement were present. It was recorded as

suspicious if similar organisms were found extracellularly.

Cultures.—Swabs inoculated with the exudate were transported to the laboratory in tubes containing 2 per cent Difco Proteose Peptone No. 3 Water. The culture material was inoculated onto solid media within a period of 3 to 5 hours after being collected. Throughout the study, two plates containing different media were used for each culture. One was a standard medium proved to be satisfactory for the growth of the gonococcus. This consisted of Difco Proteose No. 3 Agar as a base with an enrichment of 5 per cent hemolyzed horse blood and 8 per cent ascitic fluid. The second plate contained a medium with the same base, Difco Proteose No. 3 Agar to which had been added any one of a number of biologicals and chemicals in an attempt to study their effect on the culture growth of the gonococcus. The effects of vitamin B<sub>1</sub>, para-amino benzoic acid, liver extract, lysine, hemolized human and beef blood, dextrose, cysteine monohydrochloride and tyrothricin were studied. only positive effect observed was an increase in the size of the colonies when vitamin B<sub>1</sub>, liver extract or cysteine monohydrochloride were added to the medium.

The cultures were incubated in an atmosphere of 12 per cent CO<sub>2</sub> tension at 35° C. for 24 hours, and then without CO<sub>2</sub> for another 24 hours before being examined by two experienced technicians. The oxidase test was used only to ascertain that no suspicious colony had been overlooked. Suspicious colonies were examined microscopically and fished for subcultures. A strain was identified as a gonococcus, if it fermented only dextrose, showed no hemolysis on 5 per cent horse blood

agar and none or only weak growth on plain agar.

Laboratory Findings.—Three hundred and seventeen hospitalized patients were examined by smears and cultures during the observation period from October 13, 1942, to June 30, 1943, and a total of 1,759 bacteriologic examinations were performed upon them. Of the total number of patients, 87 had to be excluded from the following analysis because of incomplete observation due to lack of cooperation on the part of the patient, or for other reasons. Of the remaining 230 women, 91 (39.5 per cent) were diagnosed as gonococcus positive by either cultures or smears or both.

On the basis of the results obtained from the initial culture or smear examinations, 8 of the 91 infected patients were found to have an infection limited to the urethra and 46 others, an infection of the cervix alone. In 37 cases both urethra and cervix were found to be infected. The concurrent involvement of urethra and cervix nearly

equaled that of the cervix alone.

#### Comment

As may be seen in Table I cultures were found to be far more accurate than smears. More than half of all gonococcus positive cases would have been lost, if the diagnosis had been based on smears alone.

On the other hand, eight negative cultures were accompanied by two suspicious urethral and six suspicious cervical smears. Whether the

Table I. Results of Urethral and Cervical Smears and Cultures in a Group of 91 Gonococcus Positive Cases

URETHRA				CERVIX				
		CULT	URES			CULTURES		
SMEARS		CULTURES CULTURES POSITIVE NEGATIVE		SMEARS		CULTURES	CULTURES	
Smears positive: Smears suspicious: Smears negative:	8 7 30	6 5 30	2* 2 -	Smears positive: Smears suspicious: Smears negative:	21 14 48	20 8 48	1† 6 -	
Total:	_	41	4	Total:		76	7	

<sup>\*</sup>Cultures overgrown.
†Culture sterile.

cultures actually failed in these cases is open to question, since the organisms diagnosed as suspicious on the smears may have been any of the gram-negative organisms resembling the gonococcus which are commonly found in the female genital tract. Furthermore, it is possible that the organisms observed in the smears were gonococci which were no longer viable. Since treatment was initiated in these eight cases immediately after the first examination, no further bacteriologic identification was possible.

Limitations of the Bacteriologic Diagnosis.—Although a diagnosis of gonorrhea may be presumed from a suggestive history and from both clinical and epidemiological findings, the etiologic agent of the infection can only be determined by bacteriologic methods. These methods, however, like any other biologic tests are subject to certain definite limitations, 1, 2 the causes of which are still debated and not completely understood.

In previous studies,<sup>3</sup> it has been observed that results of smears taken from untreated patients in the advanced acute stages of the disease fluctuated from positive to negative and were therefore unreliable. This observation also holds true for the cultures, although the fluctuations appear much later, at a much more advanced stage of the infection.

Little is known of the actual factors interfering with the accuracy of the bacteriologic methods, although several explanations have been advanced. One view stressed by the Gonococcus Research Unit emphasizes the fact that biologic changes in the infected tissues and the resulting action on the organisms may cause anatomic or immunologic reactions which decrease the viability and number of the gonococci. These changes may gradually lead to a temporary or permanent hidden focus of gonococci within the deeper layers of the invaded tissues or may occasionally cause their complete destruction. These conditions are designated clinically as chronic gonorrhea, latent gonorrhea and spontaneous cure respectively.

Other investigators<sup>2</sup> believe that the limitation of the culture diagnosis is due chiefly to a lack of sensitivity of our present culture media. Experimental evidence indicates that a minimal number of viable

organisms must be present before a positive culture can be obtained. With the available culture media, this minimum represents a very large number of organisms. The ideal medium would be one sensitive enough to promote growth when only a single viable organism is present in the pus specimen.

The problem of the limitations of gonococcus culture diagnosis is therefore a complex one. There is ample clinical and experimental evidence to indicate that both factors probably play some part in limiting the accuracy of the bacteriologic findings. From the clinical point of view this limitation appears to be caused by a temporary or prolonged latency of the infection. The solution of the bacteriologic problem depends upon the development of culture methods which will insure growth of small numbers of organisms. Prolonged observation and repeated bacteriologic examinations will minimize the shortcomings of our present bacteriologic diagnostic methods.<sup>4</sup>

Operative Material.—Operative gynecologic material for bacteriologic examination was obtained from 19 patients. Of these 19 cases, 11 had a negative history and negative bacteriology and received no chemotherapy prior to their operation. Another patient, likewise bacteriologically negative, had a history of gonococcal infection 18 years previously. She received 12 grams of sulfathiazole because of salpingitis for which she was subsequently operated upon. Seven other cases were diagnosed as gonococcus positive upon admission; 6 were treated with sulfathiazole while the seventh did not receive any treatment prior to operation.

Bacteriologic material for smears and cultures were taken from 14 inflamed Fallopian tubes, 7 ovaries, 2 uterine cavities and from a ruptured tuboovarian abscess. After surgical removal, the different organs were opened and any exudate present on the surface of the mucous membrane was taken up by a sterile swab which was immersed into peptone water. The mucous membrane was then scraped with a sterile knife in order to obtain exudate from the deeper layers of the inflamed tissue. In some cases pieces of tissue were excised, immersed in peptone water and ground up in a mortar before final inoculation onto the culture media.

All of this operative material yielded negative bacteriologic findings. These results seem to contradict the previous observations of Studdiford, Casper and Scadron.<sup>5</sup> Further studies of untreated infected patients are necessary, since all but one of the gonococcus-positive patients included in our series, received chemotherapy prior to their operation.

## Summary and Conclusions

- 1. This study deals with a bacteriologic analysis of 230 patients from the gynecological service at Bellevue Hospital.
- 2. Ninety-one women were found to be gonococcus positive either by smear, or culture or both. Eight of these women had a gonococcal infection of the urethra alone, while in 46 cases only the cervix was

involved. Thirty-seven patients suffered from a concurrent infection of the urethra and cervix.

- 3. Cultures were found to be far more accurate than smears. More than half of all positive cases would have been missed if the diagnosis had been based on smears alone.
- 4. Limitations of the culture diagnosis in the advanced stages of the infection may be due to either a lack of sensitivity of our present culture media, or to a temporary or persistent latency of the disease.
- 5. The bacteriologic examination of the operative gynecological material obtained from 19 cases yielded negative results.
- 6. Seven of these 19 cases were originally gonococcus positive in the urethra or cervix, and 6 of them had received chemotherapy prior to operation.

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#### Section II. Clinical Aspects

This clinical section presents an analysis and a discussion of therapy in sulfonamide-resistant and responsive patients, and describes several provocatives tested in an attempt to improve the criteria of cure. In addition, the clinical findings in infected patients before and after treatment and in uninfected cases were analyzed and compared. The results of this comparison led us to attempt to determine whether or not the term "clinical gonorrhea" is valid and its use justified.

# Clinical Aspects

Clinical Record.—A complete clinical history was taken on each of the 230 patients examined. This history included a record of the duration of complaints, the time of exposure, previous infections and previous treatment. The amount of the urethral and cervical discharge, the presence or absence of secretions from the Skene and Bartholin glands, and the findings of adnexal involvement were all recorded.

Adnexal Involvement.—Of the 91 patients found to be gonococcus positive, 72 (79 per cent) showed an involvement of the adnexa. This high figure does not represent the true frequency of the complication in gonococcal infection in general, but is due to the fact that most of the patients required hospitalization because they were suffering from some pelvic inflammatory disease.

A similar high percentage (82 per cent) of adnexal involvement was found in the 139 patients with a negative history and negative bacteriologic examinations. It is nevertheless possible that a certain percentage of these adnexal involvements may have been residual inflammations due to previous gonococcal infection in spite of the fact that no definite history of previous gonococcal infection was obtainable. Nevertheless, in the 11 untreated cases from which operative material was examined bacteriologically, no gonococcus-positive bacteriologic results were obtained. On the basis of our present diagnostic methods, all of these 139 patients had to be considered free from gonococcal infection.

There were 16 additional patients who were bacteriologically gonococcus negative. However, they were not included in the analysis of this particular group of uninfected cases because they gave a definite history

of previous gonococcal infection.

Involvement of Bartholin and Skene Glands.—An inflammation of the Bartholin glands was found in 18 patients, half of whom had a gonococcal infection. Discharge of the Skene glands was observed in 12 gonococcus-positive patients, and in 8 gonococcus-negative women.

Treatment.—Sulfathiazole was used as the drug of choice throughout the study because of the high percentage of cures obtained and the rela-

tive absence of toxic side effects.1

Because of the short period of hospitalization of patients at Bellevue Hospital, arbitrary standards for the determination of cure had to be adopted. It was decided to assume that a patient was "cured" if three consecutive negative cultures and smears were obtained following treatment. If only two negative results were available, the patient was assumed to be a "probable cure." These are the criteria which are used throughout the following discussion.

Of the 91 patients found to be gonococcus positive, 21 are not included in this discussion either because they signed out of the hospital before therapy could be administered or cure determined, or because they re-

ceived different amounts of various sulfonamides.

Two treatment schedules were followed during the period covered by this report. The first, which followed the routine of therapy already in use in the gynecological service, consisted in the administration of a total of 21 grams of sulfathiazole, in doses of 3 grams each, given over a period of seven days.

Of the 23 patients who received this amount of sulfathiazole, 13 were cures, 6 were probable cures and 4 patients were resistant to treatment.

The average follow-up of cured cases in this group was 20 days (max. 44; min. 8), with an average of 4.6 negative bacteriologic examinations (Max. 7; min. 3). The probable cures were examined twice over an average period of 7.4 days (Max. 10; min. 2). Four of the patients in this whole group attended the research clinic for an additional follow-up period of 26.7 days (max. 51; min. 11) and an average of 4.2 examinations were performed (max. 6; min. 3). All of these patients remained bacteriologically negative during follow-up observations.

In the second treatment schedule, the daily dosage of sulfathiazole was increased to 4 grams and given over a period of 3 days so that the total

dosage administered was only 12 grams.

The remaining forty-seven patients in the infected group were treated according to this schedule of therapy. Of this total, 35 were cures, 5 were probable cures and 7 were found to be resistant to treatment.

The cured patients in this group were followed up for an average of 13.8 days (Max. 39; min. 7) and 4.7 bacteriologic examinations (max.

10; min. 3) were performed. The 5 probable cures were examined and found negative twice over a period of 4.4 days (max. 9; min. 2). Sixteen of the women in this group reported to the research clinic for an additional follow-up. An average of 3.5 examinations was performed on them (max. 9; min. 1) over a period averaging 29.5 days (max. 133; min. 6). All of these patients remained negative during the follow-up period.

It appears from these observations that slightly larger daily doses over a short period of time yielded results which are just as good, if not better, than those obtained with smaller daily doses over a longer period.

Sulfonamide-Resistant Gonorrhea.—Although no exact figures are available, the prevailing impression is that the number of sulfonamide-There are many factors resistant gonococcal infections is increasing. which may be responsible for failure of chemotherapy; among them the inadequate and irregular administration of chemotherapeutic compounds which especially in cases of self-medication, may frequently lead to a gradual drug-fastness of the organisms. This drug-fast strain may be subsequently transmitted to a new host. Another factor involved in resistance to sulfonamides, was brought out by recent studies which show that primarily sulfonamide-resistant gonococcus strains can be isolated from patients prior to chemotherapy.2 The in vitro behavior of these strains corresponds in most cases to the clinical reaction of the patient. However, some patients respond readily to sulfonamide therapy despite the fact that they do harbor an in vitro-resistant strain. This indicates that a host factor exists, separate and distinct from the strain factor and that it plays an important, if not the decisive role in the response to therapy. The exact nature of this human host factor is not yet known, but it is most likely related either to the natural resistance of the human host to any infection in general, or to a specific immunologic response.

Among the 91 gonococcus-positive women 14 (15.3 per cent) were found to be resistant to sulfonamide therapy. All strains isolated from these patients likewise proved to be resistant in vitro. Four patients were initially treated with 21 grams, and 7 with 12 grams of sulfathiazole, while the remaining 3 patients received varying amounts of different sulfonamides. Of these 14 cases, 6 were lost for further study.

Various methods of treatment were tested in an attempt to develop a simple and effective therapy for these resistant cases. A combination of gonococcus vaccine and sulfathiazole was used in five of the eight resistant cases, which had been found to be of value in the treatment of sulfonamide-resistant gonorrhea in the male.3 The vaccine was injected subcutaneously, ten injections being given on alternate days. The sulfathiazole was administered either orally or locally, following the fifth injection of vaccine. Two of the three patients who received sulfathiazole by mouth were cured, while the third failed to respond to this combined therapy and was subsequently cured by penicillin. Two other patients in the series were cured by local cervical applications of 10 per cent sodium sulfathiazole in one case, and of 20 per cent sodium sulfathiazole with 2 per cent urea in the other case. Both sulfonamide compounds were dispersed in a special wetting agent for more adequate penetration of the drug.\* In the first patient, vaginal tampons impregnated with the sulfonamide dispersion were inserted and renewed daily for 7 days. In the second case the following technique was used at the suggestion of Dr. Borris A. Kornblith. A vagi-

<sup>\*</sup>This product was made available to us through the courtesy of the Wallace Laboratories, Inc., New Brunswick, N. J.

nal diaphragm was introduced into the vagina in such a manner, that the posterior portion of the rim was fixed in the posterior fornix so that the rubber cup covered the cervix. The anterior rim was then pried away from the anterior vaginal wall just enough to permit the injection of 5 c.c. of the fluid medication into the diaphragm cup by means of a Luer syringe to which a  $2\frac{1}{2}$  inch extension was attached. The anterior rim of the diaphragm was then pushed back underneath the symphysis pubis. No medication was lost by this method and an intimate contact of cervix and sulfathiazole dispersion was assured. The diaphragm was changed every day for 7 consecutive days.

The 3 remaining patients in this series of resistant cases were treated only with repeated courses of oral chemotherapy. One of them responded to a second course of 21 grams of sulfathiazole; the second patient remained resistant to repeated administration of various sulfonamides and finally became cured spontaneously; while the third failed to respond to 3 courses of sulfathiazole (12, 28, 28 grams) ad-

ministered while she was under our observations.

We shall make no attempt to comment on these cases since the number is entirely too small to permit any conclusions to be drawn. The description of the various techniques used has been introduced to indicate different methods of approach to the problem of cure of sulfon-

amide-resistant gonorrhea in females.

Provocatives.—In order to place the determination of cure in the female on a more reliable basis, an effective provocative agent must be found. Various biological and chemical methods such as specific or nonspecific vaccines, the local application of iontophoresis, of Lugol's solution, and of various concentrations of zine sulfate, silver nitrate, glycerin and hydrogen peroxide had been tested previously without any success. The value of menstruation as a physiologic provocative was studied and it was found out that cultures taken before, during or after the menstrual period would occasionally yield positive results. These results can form no basis for judging the value of menstruation as a provocative, since similar occasional positive bacteriologic findings were also obtained on routine examinations.

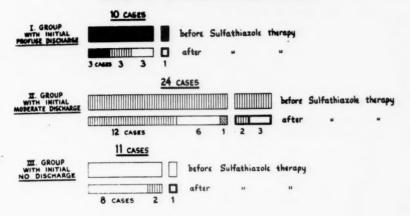
The ideal provocative is one which will produce an irritation of the cervix without affecting either the adnexa or the gonococcus itself. The first of several provocatives tested during the study was sterile dermal suture material which was inserted into the distal third of the cervical canal and kept there for a period of 24 hours. In 4 patients who were being followed up for determination of cure, the presence of the dermal suture did not produce any cervical irritation or adnexal flare-up. No positive cultures were obtained following the use of this

method

Cauterization of the vaginal portion of the cervix was the second provocative tested. This method had previously given promising results when tested in the Welfare Island Dispensary (Dr. Pellegrino). At Bellevue Hospital, 37 patients who had been initially gonococcus positive and had become bacteriologically negative after chemotherapy, were cauterized and all of them remained negative. Cauterization which was generally painless, was followed in all cases by a definite increase in the amount of the cervical discharge, lasting from 2 to 4 days. No adnexal flare-up occurred even in those cases where previous inflammation of the adnexa had existed.

The provocative effect of 6 grams of sodium chloride kept in close contact with the cervix for 24 hours by means of a vaginal diaphragm was the last method tested. The diaphragm was inserted in the manner previously described for the local use of sulfonamide dispersions. If the salt was left in contact with the cervix for more than 3 days, a superficial maceration of the cervix and of the anterior vaginal walls

# GONOGRHEAL URETHRITIS - 45 CASES. A COMPARISON OF THE AMOUNT OF URETHRAL DISCHARGE BASED ON EXAMINATION BEFORE AND AFTER SULFATHIAZOLE THERAPY



# GONORRHEAL CERVICITIS - 83 CASES.

A COMPARISON OF THE AMOUNT OF CERVICAL DISCHARGE BASED ON EXAMINATION BEFORE AND AFTER SULFATHIAZOLE THERAPY

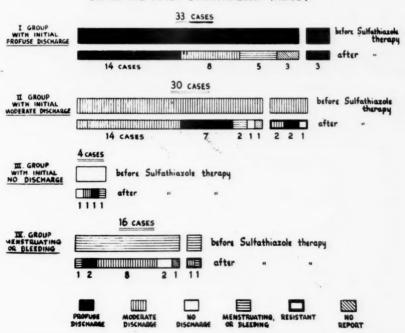


Fig. 1.—Genorrheal urethritis. Comparison of the amount of urethral discharge based on examination before and after sulfathiazole therapy.

was observed. Considerable increase in the cervical secretion was produced by the salt. In a few gonococcus-positive cases, sterile cultures were obtained following the use of this method, although the bacteriology reversed to positive after a few days. Although the number of cases tested is very small, it appears doubtful that this procedure is likely to prove of practical value as a provocative.

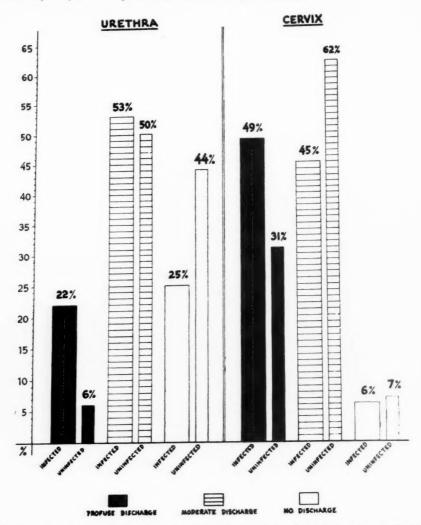


Fig. 2.—Comparison of the amounts of urethral and cervical discharges, on initial examinations, present in 91 infected and 139 uninfected patients.

Evaluation of the Diagnosis of "Clinical Gonorrhea."—Because of the rise in the incidence of venereal diseases, resulting from present war conditions, the recommendation has been made<sup>1, 4-5</sup> that contact cases with clinical signs suggestive of gonorrhea be treated immediately, even if bacteriologic findings are negative or entirely lacking. Such a recommendation is of practical value in helping to check the spread of infection by sexually promiscuous women who are known sources of infection.

Unfortunately, this recommendation may lead physicians to dispense with the confirmatory bacteriologic results of smears and cultures and to substitute for these a diagnosis of "clinical gonorrhea" based on

clinical symptomatology alone.

Such a diagnosis may perhaps be made safely, only in cases of early acute gonococcal infection presenting classical symptoms in which positive bacteriologic findings can be readily obtained. Unfortunately, this typical clinical picture appears less and less frequently, so that verification of the clinical diagnosis by laboratory methods has become indispensable.

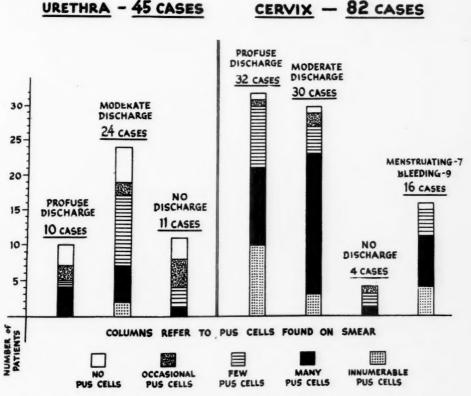


Fig. 3.—Comparison of amount of discharge with number of pus cells in corresponding smears on initial examination in a group of infected patients before treatment.

If a diagnosis of gonococcal infection could be made on the basis of clinical findings alone, there should be appreciable differences between the amounts of discharge present in infected, treated and uninfected patients.

In order to evaluate this concept of "clinical gonorrhea," observations on the discharge present in the urethra and cervix of 230 pa-

tients were analyzed.

Comment on Fig. 1.\*—As can be seen from the illustration, urethral discharge generally becomes less while the amount of cervical discharge either remains the same, or becomes more profuse after successful therapy.

 $<sup>\</sup>mbox{^{\bullet}}\mbox{All}$  initial observations following treatment were made within one to three days after termination of the rapy.

Findings Over a Prolonged Period of Observation.—In order to determine whether or not these initial findings after chemotherapy hold true over a longer period of time, observations on the amount of urethral and cervical discharge in treated cases during a period of 2 to 4 weeks were graphically plotted. The following distinct patterns

became apparent from these graphs.

Urethrat Findings.—Those cases which had no initial urethral discharge remained negative throughout repeated examinations after cure. If the original discharge was moderate, frequent fluctuations from moderate to negative were observed during follow-up, until the majority of patients finally lost all their discharge. Half of the patients with an originally profuse urethral discharge, became completely negative while the other half retained a moderate discharge.

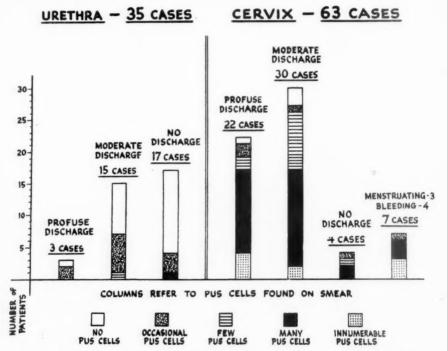


Fig. 4.—Comparison of amount of discharge with number of pus cells in corresponding smears on initial examination in a group of infected patients after treatment.

Cervical Findings.—Patients without any cervical discharge before treatment showed fluctuations in the amount of discharge following therapy. However, the number of these patients (4) is too small for any conclusions to be drawn. Wide fluctuations from moderate to profuse were observed in these patients with an initial moderate discharge. At the end of the 4 weeks' observation period most of the patients still retained their original moderate discharge while a third had developed a profuse discharge. Among the group of women with an initial profuse cervical discharge, there was a limited fluctuation from profuse to moderate during the follow-up period. Half of the patients finally retained their profuse cervical discharge, while the discharge became moderate in the other half.

These observations confirm the results shown in Fig. 1. Cases having urethral discharge before treatment either lose it entirely, or show

a reduction in the original amount of discharge after cure. In the cervix, however, there is no correlation between the amounts of discharge before and after cure. Very few of the patients lost there cervical discharge completely; the majority retained their original amount. In other words, the presence or absence of discharge in the urethra after treatment may be of some assistance in establishing cure. It is of little significance, however, in the case of the cervix since most cases retained their discharge after treatment.

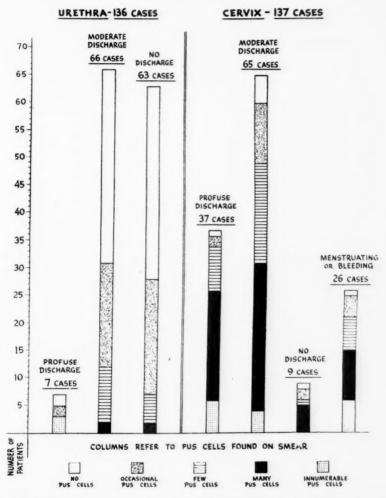


Fig. 5.—Comparison of amount of discharge with number of pus cells in corresponding smears on initial examination in a group of uninfected patients.

Comparison of the Amounts of Urethral and Cervical Discharges of Infected and Uninfected Patients.—The observations on a group of 139 women with negative history and negative bacteriology (average 1.6 examinations)\* were compared with the findings on the 91 gonococcuspositive cases. This is shown in Fig. 2.

<sup>\*</sup>Of these uninfected negative cases, 56 were examined bacteriologically at least twice. The results in this group were found to be identical with those obtained in the larger group.

As can be seen from the illustration, the presence of cervical discharge is of little aid in establishing a diagnosis, since over 90 per cent of the patients in both the infected and uninfected groups showed a moderate or profuse cervical discharge. The same holds true to a lesser extent, in the observation on the urethral discharge, where 50 per cent of the patients in both groups showed a moderate urethral discharge.

Comparison of Urethral and Cervical Discharges With the Number of Pus Cells Found on Corresponding Smears.—Color and consistency cannot be regarded as satisfactory criteria for determining the nature of discharge since the interpretation of these characteristics necessarily varies with the observer. The number of pus cells present in the corresponding smears was felt to be a more critical standard, and these

findings were therefore correlated with the amount of discharge observed. Urethra.—As can be seen from Figs. 3 to 5, the amount of urethral discharge was correlated with the corresponding number of puscells in infected cases only before treatment, but not in treated or uninfected patients. In all 3 groups, puscells were frequently found to be present in cases in which no urethral discharge was reported.

Cervix.—A close correlation was found between the amount of cervical discharge and the number of pus cells present in the corresponding smears in all three groups. As in the case of the urethra, occasional pus cells were frequently found in cases reported free of discharge.

Comment.—The cervical discharge observed was to a great extent purulent in character. The majority of cases showed this purulent discharge regardless of their bacteriologic status.

#### Discussion

All these observations clearly indicate that there is no basis for differentiating between infected, treated and uninfected patients by clinical examination alone. The diagnosis and the determination of cure of gonococcal infection in the female must be verified by laboratory methods. The current practice of public health agencies of recommending isolation and treatment of sexually promiscuous women who are known sources of infection, may be justified as a practical measure in checking the spread of gonorrhea.

Since our findings indicate that the term "clinical gonorrhea" cannot be consistently verified and is misleading, it is advisable to eliminate this designation entirely. The term "possible infectious contact" is suggested to designate those cases in which bacteriologic evidence of infection is lacking, but who require immediate treatment as a public health measure.

# Summary and Conclusions

- 1. Adnexal involvement was found in 79 per cent of the infected group and in 82 per cent of the uninfected group.
- 2. Two schedules of therapy were employed: In one a total dosage of 12 grams of sulfathiazole was given over a period of 3 days, while in the other a total dosage of 21 grams of sulfathiazole was administered over a period of 7 days. The therapeutic results are nearly identical in both groups.
- 3. Resistance to sulfonamides in gonococcal infections is determined by at least 2 known factors: the presence of a sulfonamide-resistant

gonococcus strain, and the action of a "human host factor," which appears to play the decisive role.

4. Attempts to develop a simple treatment for sulfonamide-resistant gonorrhea are described.

5. The provocative effects of sterile dermal suture material, of cauterization and of sodium chloride were tested and found to be unsatisfactory.

6. Observations on a group of 139 uninfected women, and 91 infected patients indicate that the amount and character of urethral and cervical discharge is of little or no aid in establishing a diagnosis.

7. The term "clinical gonorrhea" is misleading, and does not represent a true clinical entity.

8. The term "possible infectious contact" is suggested for designating sexually promiscuous women who are known sources of infection.

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#### THE EFFECT OF TRAVEL ON THE INCIDENCE OF ABORTION\*

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DEVELOPMENTS, the results of World War II, have produced conditions which permit a different approach to ascertaining the effect of certain environmental factors on disease. Herein lies one such study whereby the geographical location of a prenatal clinic temporarily afforded an evaluation of the effect of travel on the incidence of abortion, which is defined in the strict sense as referring to the first 16 weeks of pregnancy. It is recognized at the outset that the résumé is not complete, the reason being that the natural factors making the observation possible were altered in such a manner that further work was not feasible. Nevertheless, it is felt the results available are worthy of record.

Nowadays with the mass transfer of military personnel and migration of civilians, the doctor is frequently asked the advisability of an expectant mother taking an extended trip. From the experience of three certified obstetricians and gynecologists (A. W. Diddle, R. W. Jack, and R. L. Pearse), who have interviewed 1,058 consecutive obstetric patients between June 1, 1941 and April 1, 1944 with respect to journeys taken and the advice given previously by the family physician, it is apparent that a majority of practitioners were unwilling to sanction tours particularly during the first and third trimester. In textbooks on obstetries, where mention is made of the subject, the same idea prevails. Although it is agreed that activity helps to evacuate the uterus after other intrinsic and extrinsic factors have threatened an abortion, it has become the opinion of this group that the average means of modern travel, alone, do not predispose directly to the occurrence of the disease. When an abortion occurs in relation to a journey, the two phenomena are regarded as more or less coincidental. Basis for this contention is supported by a study comparing the incidence of abortion among a group of pregnant women who journeyed and a series who maintained a sedentary existence during the period of gestation. As previously inferred, geographic position of the clinic has permitted a study and confirmation of the impression.

To begin, it is pertinent to describe the location of this community. It is situated on an islet five miles long and one to two miles wide. The highest point above sea level is 23 feet. The climate is semi-tropical. The sun shines 360 days out of the year. The seasonal temperature variations range from 55 to 96 degrees Fahrenheit. Al-

<sup>\*</sup>The opinions or assertions contained herein are not to be construed as official or reflecting the views of the Navy Department or the Naval Service at large.

though there is less than 40 inches of rainfall annually, the humidity is enervating during the period from May to November. The area is 127 miles from the mainland of the Continental United States. The intervening space was spanned by a rough, asphalt and coral highway up to the time the observations were suspended. The route was built over innumerable keys which were joined together by a series of 62 bridges. The thoroughfare for great distances was corrugated with numerous transverse humps. These had been produced by heavy trucks and atmospheric and geologic changes. They caused an occupant of an automobile or bus to experience a drive simulating a ride in a springless vehicle going at a fairly rapid rate of speed. In order to communicate to and from the nearest railroad, 170 miles away, it was necessary for all women and children to go by bus or car over this course.\* Thus for purposes of the study all women had a common denominator with regard to the means of entering or leaving the locality which had a population of approximately 49,000 in January, 1944.

The Naval Hospital and Dispensary, from which these data were collected, served all obstetric dependents of the Navy, Marine Corps, Coast Guard and Army personnel with the section concerned.

Food, including fresh vegetables, fruits, and meats, eggs and milk, was as plentiful here as any place in the states. Like other defense areas, tenements were frequently inadequate and crowded particularly for families of enlisted men.

### **Observations**

Patients were represented from all 48 states, two foreign countries and the District of Columbia. A majority came from 26 states most of which were along the eastern seaboard. Included were California and Texas. The distribution gave a fair sampling of women from the entire United States. All the expectant mothers were white with the exception of 11, seven of whom were Negroes, two Mexicans and two American Indians. Their age averaged 23.5 years with a range from 16 to 42. Two hundred and fifty-five (24 per cent) were multigravidas and 803 primigravidas. Of the former number, 217 (20.5 per cent) were parous, having borne one to five children each. Thirty of these, also, had had one to three abortions each. Among the remaining 38 women, 35 had previously lost one to three pregnancies in the first trimester. Two others had had one ectopic and one abortion each while a third had produced only one ectopic. Incidentally, the latter had a second tubal gestation while under our care.

Ninety-eight and one-tenths per cent (1,038 cases) of the patients were under observation to the end of the third month of pregnancy while 91.5 per cent (968 cases) were followed beyond the fourth month. All abortions seen, occurred before the end of the third month with the exception of eight.

During the period of scientific scrutiny, a diagnosis of abortion was made and proved anatomically 123 times or an incidence of 11.6 per cent. Three individuals were seen through two each. Of the 123, 23

 $<sup>{}^*</sup>Six$  weeks before airplane service was opened for civilians, but none of the individuals in this study traveled by that route.

were dropped from the study for three reasons: (1) there was no information on travel for 20; (2) two were criminally induced; and (3) one was a therapeutic measure done because of hypertensive cardiovascular disease. None of the last three traveled. Thus, for purposes of a comparative study 100 untimely births were obtained. Of this number, 32 were from multigravidas, 12 of whom had never given birth to a viable infant.

The 20 expectant mothers excluded for reason of no travel data were among the first 223 women seen before information was gathered. Left were 835 for whom complete material was collected for 446. Three hundred and ten of the remaining 389 were under surveillance beyond the first four months of pregnancy. There was no report of vaginal bleeding or abdominal cramps from this group. From knowledge gained through survey of the personnel turnover at this activity from month to month, there was calculated to be 200 of the 310 that did not journey and 110 who did. The distances covered by the latter are not available, but it seems justifiable to include them to evaluate the final incidence of abortions within each series and to eliminate the factor of selection as much as possible. It can be safely said that the travelers passed over at least 170 miles one way. In the final analyses there were 289 travelers and 467 nonjourney women for the first 16 weeks under study.

Among the 446 women with complete data, 215 took no trips, 179 transgressed 170 to 6,000 miles each in a continuous tour by bus and/or car and/or train before the end of the fourth month, and 52 others covered 170 to 4,000 miles each after this period of time. Repeated trips averaging 1,200 miles were again made by 20 of the 179 patients after the fourth month. The distribution by state, age of the patients, blood counts and body weights were approximately equal for the different groups.

The abortions predominated in the second month (51 cases) with 41 in the third and 8 in the fourth. The clinico-anatomical classification is shown in Table I.

Table I. Classification of 100 Abortions at the Time of Admission to the Hospital on Anatomic Basis

CLASSIFICATION	NO. CASES
Threatened	63
Incomplete	28
Complete	2
Inevitable	2
Septic	2
Missed	2
Criminal*	1
Total	100

\*This patient was seen before and after having consulted an abortionist. She traveled 1,800 miles without difficulty before the criminal procedure was performed.

Excluding the criminal abortion, the clinical symptoms and signs were vaginal spotting or gush of blood in 91 instances and cramps or acute lower abdominal pain in the other eight for the onset. Certain diseases and traumatic factors were encountered in 19 persons. Pregnancy complicated hypothyroidism twice, hemolytic icterus and pernicious anemia once each. All but one patient, a hypothyroid, lost the fetus.

Bleeding followed bimanual examination in two instances. In one, it was felt trauma was not sufficient to initiate the onset while the other was equivocal. In the latter, an outside doctor had tried to convert a uterus lying posterior, to an anterior position by pelvic manipulation. Both pregnancies were wasted.

Thirteen individuals had bleeding begin a few minutes to 24 hours after coitus. Four of these aborted while the other nine were only threatened. Nine of the total were seen 12 to 48 hours after the discharge appeared. None had any lesion of the cervix, vagina, urethra or rectum to account for the abnormalities. Afterwards, when they reported for examination, dark blood was visible in the cervical os of eight. The untimely births came from this number. The proximity of the time of the trauma with the period of onset of bleeding suggests that coitus might have been predisposal to the pathologic change.

Of the 19 women discussed above only three had traveled. More will be said about them subsequently.

Consideration may now be given to the problem of travel and abortion. Of the 289 travelers, who toured before the end of the fourth month, 16 or 5.6 per cent had untimely births as contrasted to 84 or 17.9 per cent occurring among the control or sedentary series. Based on the 179 protocols, where the distances covered were known definitely (Table II), 46 (25.7 per cent) were multigravidas and 37 (20.6 per cent) parous. These figures correspond favorably with the percentages for the entire clientele. Of the 16 journey women having abortal

Table II. Miles Traveled During the First Four Months of Pregnancy for  $179^*$  Patients; Abortions Occurring Within That Period of Time

TOTAL TRIPS	MILES TRAVELED	TOURS ACCORDING TO THE MONTH OF GESTATION		ABORTIONS		
		NO. CASES	MONTH	NO. CAS	ES CLASSIFICATION	NO. SALVAGED
1	25 by motorcycle	1	2	1	Incomplete	Wasted
		16	2	1	Incomplete	Lost
62 1	170 to 500	25	3	3	Threatened-2 Incomplete-1	Saved-1; lost-1 Wasted
		21	4	1	Threatened	Lost
10 5	500 to 1,000	2	2	1	Complete-1	Wasted
		5	3			
		3	4			
89 1,000 to 2	1,000 to 2,000	36	2	5	Threatened-2 Incomplete-2 Inevitable-1	Four wasted or lost; one saved
		22	3			
		31	4	2	Threatened-2	Two saved
37 2,	2,000 to 4,000	10	2	2	Threatened-1 Complete-1	Saved Wasted
		12	3			
		15	4			
1	over 6,000	1	2			
200 tot	al	200		16	16	Five saved; 11 lost or wasted

<sup>\*</sup>The journeys of 178 patients included the 127 mile stretch over the keys by bus or car. Of the total 200 trips, one was made by 146 women, two by 21 others and three by the remaining four.

difficulties, seven were parous and one other gravid previously. The

remaining eight were primigravidas.

Only one patient had a bloody vaginal discharge during transit over a 1,700 mile course, 1,530 by train and 170 by bus. The case was classed as threatened. Two others began bleeding 6 to 12 hours, respectively, after a ride of 170 miles in a car. Subsequently one person put on an acrobatic dance in a U.S.O. show. It is probable the athletic performance was the more important of the two factors under consideration as predisposing to the interruption of the pregnancy. Both cases were admitted as incomplete abortions. A fourth woman had an acute attack of lower abdominal cramps and gush of blood shortly after a bumpy motorcycle ride. This was also entered as incomplete. The second day after reaching their destination, following in order, a 340, 1,000, 1,800 and 2,000 mile tour. four expectant mothers developed vaginal bleeding. Two eventually went to term while the other two were wasted. Seven patients began losing blood seven to ten days after covering 300 to 4,000 miles each. Two of these gestations were salvaged. The sixteenth case began to have profuse serosanguineous discharge 14 days after a 1,700 mile journey by car was begun and 9 days after it was completed. The Friedman test had been reported as "negative for pregnancy" when the trek was started. However, examination at this end of the course revealed a full two months' gestation. It was eventually lost.

Assuming that travel predisposed to abortion, it is unlikely that any effect could be expected in the last eight cases cited above for the reason the time of the journeys antedated the pathologic change too long, unless consideration of Streeter's work serves as an explanation. He found degenerative changes began often one to six weeks before the actual evacuation of the uterus occurred. It should be stated that abortal signs appeared in three of the eight, 12 to 24 hours after inter-

course.

Neither the distances covered and the method of travel employed nor the time of the month at which a journey was taken revealed any significant differences in the incidence of abortion. The 72 women, 20 of whom had also toured before the end of the fourth month, showed no evidence of miscarriage or premature labor on migrating from 170 to 4,000 miles each subsequent to the period stated.

#### Comment

Up to the present time, statements exist in the literature about cautioning pregnant patients against travel, but in so far as clinical data are concerned, material to substantiate the contention is nil. Obstetricians and gynecologists differ in their opinion regarding the advisability of traveling. Some believe any form of journey, short or long, involves risks.<sup>2, 3</sup> This idea rests on one or both of two premises: one, that riding may stimulate the neuromuscular mechanism to initiate uterine contractions to the point of threatening an abortion. The other entails the individual finding herself in a situation where treatment for a catastrophe is not easily obtained. Of the two factors, the first appears equivocal and from the study presented it becomes more so.

Formerly, when women became pregnant, the majority stayed near home and abstained from taking extended trips. As a result, no one physician or clinic was apt to have the opportunity of reviewing the results of travel on the incidence of abortion in a relatively large number of cases. And, today means of transportation are so modernized that they do not lend themselves well to evaluate the abnormalities, if any, produced by rough riding.

Probably one of the largest collection of figures available on the transfer of pregnant women over considerable distances are to be found at the University of Iowa where over 17,000 parturients have been delivered between July 1, 1926 and January 1, 1944 and where the majority have been brought by ambulance from all parts of the State of Iowa—the greatest mileage is 350—in the last trimester. Transportation, however, has been conducted largely over well-paved roads. Impressions of the writer gained at this institution never revealed any significant predisposition to the onset of labor or premature birth. Yet this series does not suffice as a comparison for the subject at hand. Here, the problem involves the first four months of gestation when the choriodecidual relationships are supposedly unstable. abortion implicates in most instances a dysfunction lying outside the fetus and possibly outside the ovum. There is reason to believe this is hormonal in nature.4 Disturbance of an extrinsic, traumatic nature to be effective would necessitate interference with the blood supply to the nidatory site, damage to the membranes, serious injury to the young corpus luteum or activation of the neuromuscular mechanism of uterine evacuation by local irritation or by cerebral abnormalities.5 Of the factors mentioned, the last one would appear to be the logical cause, but clinical results offer little, if any, confirmation that there is a consequence from the usual procedure of transport.

A notation is required as to why more abortions were found among the sedentary group than among the travelers. It is difficult to say. Nevertheless, three reasons are given: the number of cases available was statistically too small. This was inferred in the introduction. Second, patients who would have left this area before or who would have come to this section in the first four months of their pregnancy were prevented from doing so by reason of the actual occurrence of a pathologic birth. Third, the economic and gravid factors undoubtedly played a part in selection. Mothers with children could not come to the islet as readily as women without offspring. But the final results warrant the conclusion that travel by car or bus over the rough stretch of highway covering the keys and over modern roads and/or train in the states did not increase the incidence of abortion among travelers as opposed to nonjourneying women. It is doubted that transportation alone predisposed to abortion except in one case where the woman had ridden a motorcycle a few hours previously. Even here the cause and effect connection is equivocal. On the other hand the physical activity concomitant with riding is conceded to have facilitated interruption of an early gestation where intrinsic and other extrinsic factors were already

in action. In general, it appears that the principal argument against traveling entails the necessity of an expectant mother being cared for medically wherever trouble may arise and with such resources as are present. For this reason, pregnant women must assume the responsibility to journey long distances.

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# SOME ACQUIRED BONY ABNORMALITIES INFLUENCING THE CONDUCT OF LABOR\*

# With Reports of Recent Cases

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M UCH has been written about labor in women with abnormal bony pelves. Most of these pelves are congenitally abnormal. In this paper, however, we are concerned only with those abnormalities which have been acquired, due to either trauma, specific disease, or to neoplasms. It must be kept in mind that some of these conditions can affect the bony pelvis directly. Others, in the course of time, can exert an indirect effect through abnormality of the spine or lower extremities. Schauta, Litzmann, Williams¹ and more recently Caldwell and Moloy² have included acquired abnormalities in their classifications of the pelves. For purposes of reference the following simplified classification is suggested.

ACQUIRED BONY ABNORMALITIES INFLUENCING THE CONDUCT OF LABOR

I. As a result of Trauma	ſ	Pubis Ischium
A. Fractures B. Dislocations	Pelvis	Ilium
D. Distocations	1 civis	Sacrum
II. As a result of Specific Disease		Coccyx
A. Bacterial Infection		coccyn
(Tuberculosis		
Osteomyelitis		
B. Dietary Deficiency		
Rickets and Osteomalacia		
C. Miscellaneous	₹	Dorsal
Diseases of Nervous System (Polio)	Spine	Lumbo-
Osteoarthritis		sacral
Acromegaly		
Paget's, Multiple myeloma, Syphilis, Echinococcus		
Cysts, etc.		
11. As a result of Neoplastic Disease	Lower	Upper
A. Benign	Extrem-	Femur
B. Malignant	ity	Hip

Recently we have had experience with cases in each of these main categories which will serve as examples.

## Trauma

Until the advent of fast motor travel in recent years, the incidence of pelvic fracture as a complication of labor was comparatively rare. B. C. Hirst<sup>3</sup> in the original edition of his *Textbook of Obstetrics*, published

<sup>\*</sup>Read at a meeting of the Philadelphia Obstetrical Society, December 2, 1943.

in 1898, states: "Only 0.8 per cent of all fractures involve the pelvis. When one considers that almost all grave injuries of the pelvis end fatally, the rarity of a pelvic deformity dependent upon united fractures of a pelvic bone in a woman of childbearing age may be appreciated."

In recent years, however, the incidence of pelvic fracture has greatly increased. At the Kensington Hospital for Women, three such cases have been encountered by us in the past 28 months. It was surprising, therefore, to find so few cases reported in the English language. Standard textbooks on obstetrics briefly mention the subject, or ignore it entirely. The 1941 edition of Williams' Obstetrics<sup>4</sup> gives in essence the same material that was included in B. C. Hirst's original edition in 1898.

There are a number of factors which recently have influenced the incidence of pelvic fracture in women of childbearing age.5 The widespread use of the automobile, and the ever increasing speed of these vehicles have been a prime factor. Fractures of all kinds have become more prevalent and fractures of the pelvis have become relatively more common than ever before. They are quoted by Kellog Speed<sup>6</sup> as comprising 3 per cent of all fractures. In former years, the vast majority of fractures of the pelvis occurred in men, but in the most recent series of cases from 44 per cent to 50 per cent<sup>7</sup> of these injuries occurred in women. The female pelvis is known to be more frail than that of the male, and so we may expect to see an ever increasing number of pelvic fractures, not only because of automobile travel, but also because women are filling men's jobs in industry now more than ever before. Another important factor is the decreased mortality in cases of pelvic fracture. Formerly up to 50 per cent of the patients died. Recently, Eliason and Johnson reported but five deaths in a series of sixty cases of acute fracture of the pelvis. Sever8 reported but one death in his series of fifty-one cases.

Fractures may occur in almost any portion of the pelvis. Eighty per cent of the cases have multiple fractures. Common sites are the rami of the pubis and ischium, and the alae of the ilium. Fractures of the pelvis are usually the result of severe impact. Eighty per cent now occur in automobile accidents. The injury commonly occurs as the result of the passenger in the rear seat of an automobile being thrown forcibly against the side of the car. Being thrown from a car, or crushing accidents are not unusual happenings. Occasionally, however, simply falling on an icy pavement, or tripping over a rug may cause pelvic fracture in women.

From the obstetric standpoint, the lateral crushing fractures are the most important because greater distortion of the pelvic inlet is likely to result. Fracture of the descending ramus of the pubis is of serious import if there is a great deal of displacement because the outlet of the pelvis may be encroached upon. A severe fracture about the symphysis pubis with separation or displacement is dangerous because of the pos-

sibility of injury to the urethra or bladder upon descent of the presenting part, even though no such injury had been evident at the time of the fracture.

These facts are extremely important from the medicolegal point of view. As these accidents increase in young women, the obstetrician will be called upon more frequently to give testimony in court. In these instances, it would be well to bear in mind the favorable effect that is exerted by the lapse of time. After a few years have passed, some of the most severe cases of pelvic fracture are surprisingly free of excessive callous formation or severe pelvic deformity. Quite often nature helps to compensate for these deformities by bringing about premature labor or producing a small baby. In giving expert testimony in these cases, we should determine if possible the type of pelvis present before the fracture occurred. A fracture can occur in a justo-minor or funnel-type pelvis just as well as it can in the gynecoid type. To remember this might save embarrassment during cross examination.

The conduct of labor in cases with fracture of the pelvis depends upon the degree of distortion present, the size of the baby, and how recently the fracture occurred. Elective cesarean section should be done where there has been a severe lateral crushing injury causing obvious obstruction. This operation should also be done in cases of marked displacement in the region of the symphysis pubis where injury could occur to the urethra or bladder. This also is probably the best procedure in those cases with acute fracture of the pelvis with displacement, if labor starts. In borderline cases of inlet contraction, a trial of labor can always be employed to see if engagement occurs. It is safe to say, however, that most cases will deliver vaginally without undue difficulty. It is often wise to terminate the second stage of labor early with forceps in order to lessen the strain on the affected region.

The dislocation of joints due to trauma sometimes may cause concern. Dislocation of the head of the femur usually causes no marked pelvic deformity even though it be congenital. In case of bilateral subluxation, the heads of the femora may project into the pelvis through the sciatic notches when the patient is put in the normal abduction position for labor. This causes marked bilateral narrowing of the pelvis. Verning<sup>9</sup> has delivered sixteen such cases normally simply by abandoning the obstetric position and adducting the legs.

Forward displacements of the coceyx with ankylosis of the sacro-coceygeal joint due to an old injury are met with occasionally. Hirst and Wachs<sup>10</sup> have summarized this condition well. While this may cause dystocia at the pelvic outlet, it usually is not serious. The delivery is ordinarily completed with low forceps and the obstructing coceyx forcibly pushed backward. It is not common for the mother to have residual symptoms after this procedure, although occasionally the coceyx must be removed surgically.

## Specific Disease

The second category in our classification includes those abnormalities caused by a specific disease. These cases are uncommon; those due to bacteria, especially tuberculosis, are seen most frequently. The rachitic pelvis was at one time a rather common cause of pelvic dystocia. Fortunately, at least in most parts of this country, this sequela of dietary deficiency is now seldom seen. Under the miscellaneous group of bone diseases which includes syphilis, Paget's disease, multiple myeloma and such entities, the course of labor is seldom affected. Occasionally, ecchinococcus cysts of the pelvic ring will cause dystocia. De Sa's¹¹ case of bizarre crippling due to arthritis deformans and Bringle's¹² interesting case of acromegaly, both delivered their offspring spontaneously. In cases of old poliomyelitis with unilateral lameness, there is sometimes a slight obliquity of the pelvis, but never as severe as in those cases in which the lameness is due to hip disease.

Under bacterial disease, osteomyelitis of the pelvic bones has been described in detail in Wilensky's<sup>13</sup> excellent monograph. In our experience, this disease has not caused severe pelvic dystocia. We, therefore, direct our attention to tuberculosis since we recently have had experience with a case of low Pott's disease and two cases of tuberculous hip joint disease.

Before the tuberculin testing of cattle, these complications were more common. Pott's disease, causing kyphotic pelvis, is commonly quoted as occurring once in every six thousand labors. When kyphosis occurs in the dorsal region, there is usually a compensatory lordosis, so that the pelvis itself is not greatly affected. However, the gibbus or hump may be situated in the lumbar or sacral region. Generally speaking, the lower the gibbus, the greater the pelvic deformity, although the greatest deformity becomes manifest when the kyphosis is situated at the lumbosacral junction in the region of the promontory of the sacrum.

A typical kyphotic pelvis<sup>14</sup> is characterized by an elongated conjugata vera and a contracted outlet. This is brought about by the fact that the body weight transmitted to the lumbosacral hump is directed both downward and backward. This latter force draws the promontory of the sacrum backward and upward thus increasing the conjugata vera. When this occurs, the posterior extremities of the innominate bones are pushed apart rotating their upper portions outward and their lower portions inward. This causes a transverse contraction of the outlet by bringing the ischial spines and tuberosities closer together. As the upper portion of the sacrum is rotated backward its lower portion is pushed forward thus narrowing the posterior sagittal diameter of the outlet. External measurements of a kyphotic pelvis reveal the distance between the iliac crests to be equal to, or greater than, that between the two trochanters. The diagonal conjugate is deep. The bischial is small as is also the posterior sagittal measurement.

When labor starts, the engagement of the presenting part may be interfered with because the uterus many times inclines forward due to the fact that the abdominal cavity is shortened in a low kyphosis. This usually may be remedied by the application of a tight abdominal binder. Ordinarily, however, no great difficulty is met with until the presenting part reaches the region of the ischial spines. If the sum of the biischial and posterior sagittal measurements equals fifteen cm. or more, no great difficulty in performing a vaginal delivery need be anticipated. If the sum of these two measurements is less than 15 cm. and a good-sized living baby is present, suprapuble delivery is the procedure of choice.

Tuberculous coxitis when it occurs in early life nearly always causes an obliquely contracted pelvis.14 The distortion is almost always on the healthy side. The diseased leg is shortened so that in walking the body weight is transmitted in great part to the well leg. This tends to flatten the iliopectineal line and the sacrum is rotated to some degree about its vertical axis, so that its anterior surface looks toward the well side. The pelvis is affected throughout from the inlet to the outlet. X-ray pelvimetry is of prime importance in evaluating the prognosis of labor in these patients. If it appears probable after such a study that engagement will not occur, cesarean section should be performed before the onset of labor. Otherwise, a trial of labor should be utilized to see if engagement takes place. The majority of cases will deliver spontaneously. Some authorities feel that in cases where the ankylosed leg assumes an awkward position and indications for a forceps delivery exist, internal podalic version gives better results because of difficulty in applying the forceps.

# Case Reports

#### I. Fractured Pelvis

Case 1.—Mrs. M. W. This 31-year-old gravida i, para 0 was involved in a serious automobile accident at eight months' gestation. She suffered a double fracture of the horizontal ramus of the left pubic bone (Fig. 1). She was treated for a month with bed rest on a Bradford frame. At term, the head failed to engage, and because of the recent pelvic fracture, a cesarean section was done and a living seven-and-a-half-pound infant delivered. A year later, this patient again became pregnant. At eight months' gestation, an x-ray of the pelvis (Fig. 2) revealed complete healing of the old pelvic fracture without significant deformity. She was allowed to go into labor spontaneously at term, and was delivered after a short uneventful labor with outlet forceps of a living eight-pound child. Her puerperium was uneventful and she now is enjoying normal health.

Case 2.—Mrs. R. W. This 28-year-old gravida iv slipped and fell upon an icy pavement at eight and a half months' gestation. She was unable to walk, so was taken to the hospital where an x-ray revealed a linear fracture of the right pubic bone extending from the symphysis pubis to the obturator foramen. There was no displacement. The patient was treated with simple bed rest. After eight days, she went

into labor spontaneously and was delivered of a normal full-term baby eight hours later with the aid of outlet forceps. The puerperium was normal. Two weeks following delivery, another x-ray showed no change from the previous film except for the presence of beginning of callous formation. The patient was then able to walk and returned to her home a few days later. At the present time, she is again pregnant and has no symptoms whatsoever.

Case 3.—Mrs. M. D., 23-year-old gravida i, para 0, who had been in a serious automobile accident five years previously. At that time, she sustained multiple fractures of the pelvis with displacement of fragments of the rami of the pubes and ischii. The sacrum was also fractured and the bladder punctured. She visited one of us when she was three months pregnant. X-rays were taken (Fig. 3) which showed marked distortion of the pelvic inlet due to old united fractures, espe-





Fig. 1.

Fig. 2

Fig. 1.—Patient at 8 months' gestation with acute fracture of the horizontal ramus of the left pubic bone with some displacement. Delivered by cesarean section.

Fig. 2.—Same patient twenty months later with her second pregnancy. Note how the contour of the pelvis has been almost completely restored. Delivered vaginally.

cially of the left pubic bone. The left obturator foramen showed 75 per cent diminution in its anteroposterior diameter. The body of the left pubic bone was seen to be impacted into the superior and inferior rami causing great narrowing of the forepelvis, although the internal conjugate measurement was 10 cm. and the greatest transverse diameter was 10.4 cm. The patient went through a normal prenatal course without change in this picture as shown by repeated x-rays. Because of the previous bladder injury and the obvious pelvic distortion, it was decided that an elective cesarean section would be the wisest means of delivery. She was admitted to the hospital a week before the estimated date of confinement, but went into labor early in the morning of the day she was to be sectioned. After an easy labor of five hours' duration, she spontaneously delivered a living six-and-a-half-pound child. The patient had an uneventful puerperium. X-rays taken ten days after delivery showed no change whatever from the previous films.

#### II. Cases of Tuberculous Hip Disease

Case 4.—Mrs. D. B. A case of a 20-year-old gravida iii who had had two previous cesarean sections before her first visit to us. She gave a history of hip disease since the age of ten years, and had walked with a limp ever since. X-ray taken of the pelvis showed a characteristic tilting but no deformity of the pelvic ring. Information was obtained that the previous cesarean sections had been done because of increasing hip pain during the last several weeks of pregnancy. It was obvious, however, from both clinical and x-ray measurements that the pelvis was ample in size. Because of the previous sections and the severe pain that always occurred near term, another cesarean section was done and a Pomeroy sterilization carried out.



Fig. 3.—Multiple fractures of pelvis and punctured bladder sustained five years before first pregnancy. Note the contracted forepelvis and bizarre contour of the left public bone and obturator foramen, Delivered vaginally. This picture was taken at three months' gestation.

Case 5.—Mrs. N. A case of a 29-year-old gravida i, para 0, who had tuberculous coxitis when a child. She then developed an ankylosed hip with marked tilting of the pelvis. X-rays revealed only a slight oblique contraction of the pelvic inlet. She was delivered without complication of an eight-pound baby with outlet forceps. A year later, she spontaneously delivered a nine-and-a-half-pound infant. The only unusual procedure that had to be used in delivering this patient was the pulling of her involved leg laterally with a sheet. This had to be done in order to give room for delivery because the affected hip was ankylosed and fixed in adduction.

#### III. Kyphotic Pelvis

Case 6.—Mrs. E. B. A case of a 28-year-old gravida i, para 0 who gave a history of having had trouble with her spine since she was six years old. She had subsequently had bilateral psoas abscesses which drained for years but finally closed up. Physical examination revealed

a gibbus in the lumbosacral region. The pelvic inlet was apparently horizontal and the thoracic cage rested upon the alae of the ilii. The pelvic measurements were:

Intraspinous 26 cm. Intercrestal 29 cm. Intertrochanteric 28 cm. Diagonal conjugate 14 cm. Biischial 9.5 cm.



Fig. 4.—Kyphotic pelvis with gibbus in lumbosacral region. This film was taken at term. Note the engaged head with the body obliquely forward; the latter is due to the great shortening of the abdominal cavity. The application of a tight abdominal binder helped to correct this. Delivered vaginally with midforceps.

X-ray showed the upper portion of the sacrum to be pushed posteriorly and its lower portion to be pushed forward. Apparently, the patient would have normally had a very spacious pelvis and even though the inlet was now dilated, the outlet, while it was somewhat contracted, seemed ample for the passage of a normal-sized baby. Therefore, she was allowed to go to term and have spontaneous labor. At this time she had an extremely pendulous abdomen because of the shortness of her abdominal cavity. (Fig. 4). An abdominal binder was applied. Labor progressed normally until the vertex reached midpelvis where it became arrested. She was delivered after seventeen hours of labor with midforceps of an eight-pound three-ounce infant. The puerperium was normal.

#### Neoplasms

Our third category embraces abnormalities due to neoplasms. These are unusual but interesting. Neoplasms of the spine ordinarily cause no difficulty in pregnancy unless they involve the sacrococcygeal region and there are but few cases of this sort reported. Those affecting the femur may make adjustments necessary in the conduct of labor. There are very few cases reported in the literature<sup>15</sup> of primary sarcoma of the upper femur associated with pregnancy. Such a case (Fig. 5) is now under the observation of one of the authors and will be reported later.

Tumors of the pelvic girdle can, however, cause serious dystocia. Of the malignant tumors, 5 per cent of osteogenic sarcomas, which is a neoplasm of young people, occur in pelvic bones, according to Francisco. Metastatic carcinoma frequently involves the pelvis, but usually is seen in older individuals. The benign neoplasms are the most common. These are usually bony exostoses which may be found over the iliopectineal eminences, the crests of the pubis, or over the pelvic joints. Like the enchondromas, which grow rapidly during pregnancy, they often cause serious obstruction to labor. These usually are symptomless, and therefore often are not recognized until they have arrested the progress of labor. In one series of thirty cases quoted by Williams, twenty-one cesarcan sections and three destructive operations upon the fetus were necessary. While such tumors are seldom encountered, the obstetrician should have knowledge of them and keep in mind their possible presence in vague cases of dystocia.



Fig. 5.—Sarcoma of upper right femur complicating pregnancy.

#### Summary

- 1. A simplified classification of acquired bony pelvis abnormalities and their effect upon the conduct of labor has been presented and discussed.
- Cases recently seen have been presented as examples of each main category.
- 3. It is our opinion that more emphasis in teaching should be placed upon acquired anomalies of the pelvis, especially pertaining to fractures of the pelvis which are rapidly increasing in frequency.
- 4. After study of these acquired anomalies, it is found that operative delivery in such cases should be the exception rather than the rule.

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5501 GREENE STREET

# THE CHARACTER OF VAGINAL DELIVERY FOLLOWING CESAREAN SECTION

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THERE is a difference of opinion concerning the nature of the first vaginal delivery occurring in a patient who has had a cesarean section. The question is whether or not the labor is comparable to that of a multipara or a primipara, especially in regard to the total duration of labor and the course of the first stage of labor.

This study comprises a review of 34,356 pregnancies occurring in the Woman's Clinic of the New York Hospital from September 1, 1932 to December 31, 1943. Of this total, 496 patients had a previous cesarean section, an incidence of 1.44 per cent. In this group 109 patients (an incidence of 21.97 per cent) were delivered of a full-term or premature infant per vaginam without ever having had a vaginal delivery preceding the first cesarean section.

The histories of these 109 patients were studied in detail and divided into three groups in order to compare the duration of the stages of labor. The first group consists of the total 109 cases having a vaginal delivery following a cesarean section for the first pregnancy; the second consists of 39 of these cases in which a cesarean section had been performed for an indication other than contracted pelvis, and in which there had been some labor; the third group deals with 36 cases in which an elective cesarean section had been done with no labor prior to the operation.

Table I shows the average duration of labor in hours for each of the groups:

TABLE I

	GROUPS					
	I		II		III	
NUMBER OF CASES	109		39		36	
Hours of labor before cesarean section	19		11	57/60	0	
Vaginal delivery First stage of labor	15	14/60	15	27/60	16	33/60
Second stage of labor		54/60		45/60		56/60
Total labor	16	19/60	16	20/60	17	46/60

The widely accepted average duration of labor in primiparas is 18 hours and in multiparas 12 hours.<sup>1</sup>

Many of the sections in Group I were done for contracted pelves, a factor which would tend to increase the duration of labor in subsequent pregnancies. The average duration of labor in this group was 16 hours and 19 minutes. In Group II, in which the factor of contracted pelvis had been eliminated, the duration of labor averaged 16 hours, 20 minutes, the duration stated for the labor of primiparas with normal pelves.<sup>2</sup> It is seen that in the 36 patients of Group III in whom there had been no previous labor, the average duration of the labor of the vaginal delivery was the same as that stated for primiparas.

McLane is in agreement with these conclusions. In a study of 38 cases of vaginal delivery following cesarean section, he concludes that since most were para i the average labor of 15 hours, 36 minutes, is evidence in favor of the primiparous nature of labor following primary cesarean section.<sup>3</sup>

It is probable that labor preceding a primary cesarean section may alter the cervix, tending to produce a multiparous behavior observed at subsequent labors, but this is not seen if no labor has preceded the section.

The second stage of labor is about the same for all three groups, which could be explained by the fact that forceps were used frequently to terminate the second stage of labor, the indication being a previous cesarean section. Table II shows the incidence of forceps and episiotomies in the groups studied.

TABLE II

	GROUPS			
	I	II	111	
Forceps	56 per cent	46 per cent	61 per cent	
Episiotomy	87 per cent	84 per cent	91 per cent	

The incidence of forceps deliveries in this clinic as a whole is 13.06 per cent, and of episiotomy 50.86 per cent. There was no instance of ruptured uterus in the 109 cases of vaginal delivery.

The fetal mortality, including premature, full-term and neonatal deaths, in this series of 109 cases was 5, or 4.6 per cent, as compared with a figure of 3.10 per cent for the whole clinic.

## Summary and Conclusions

- 1. In 34,356 obstetric patients admitted to the New York Hospital, a previous cesarean section had been performed in 496, or 1.44 per cent.
- 2. Of this group of 496 patients, 109, or 21.97 per cent, were delivered vaginally of a viable infant, without having had a vaginal delivery previous to the cesarean section.
- 3. The average duration of labor of the first vaginal delivery in a patient who was delivered by cesarean section in her first pregnancy is virtually identical with that in a primipara.

4. In the group of 109 patients with cesarean section followed by vaginal delivery, there was one maternal death, due to cerebral embolism.

5. The fetal mortality in this series was 4.58 per cent.

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# SUBCLINICAL POST-PARTUM SALPINGITIS AND ONE-CHILD STERILITY, A PATHOLOGIC STUDY

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A CUTE salpingitis is a recognized sequel of puerperal endometritis, complicating most frequently criminal abortions, to a lesser extent legitimate operative procedures, and occasionally spontaneous term parturition. Curtis¹ summarizes the generally accepted concept of this lesion as follows: "It has long been known that infection which complicates abortion travels through the cellular tissues rather than along the mucous membrane. The tubes, if diseased, present only part of a relatively diffuse process. We have learned that the tubes when involved are usually attacked from without, the infection producing a perisalpingitis with tendency to invasion of the mucosa last, if at all."

The absence of mucosal involvement is emphasized by most authors, who lay stress upon this fortunate circumstance because of the retention of tubal patency subsequent to the lesion.

Some few authors deduce from their clinical experience that the Fallopian mucosa is not spared and that unexpected tubal obstruction, in some patients, may be due to unrecognized post-partum salpingitis. Rubin,<sup>2</sup> for example, found that of 195 instances of one-child sterility (a few with 2 children) 45 cases (23 per cent) had nonpatent tubes. In these cases no cause of an ascending infection other than the previous pregnancy could be assigned. Holtz<sup>3</sup> after examining the problem of one-child sterility concluded, on a purely inductive basis, that such sterility may be due, in some measure, to an ascending salpingitis contracted during parturition, or the puerperium with consequent occlusion of the tubes. DeLee and Greenhill<sup>4</sup> in a discussion of post-partum sterilization remarked, "There is good reason for believing that infection sometimes invades the tube as it does the uterus after delivery."

An intensive search of the literature failed to reveal any pathologic studies directed toward the solution of the problem presented by such opposed views.

#### Material

The material for this study consists of bilateral tubal segments removed, in the course of sterilization, from 67 patients. Of this number, 50 were obtained post partum following normal delivery and the remaining 17, used as controls, upon cesarean section cases. The operations were performed between March 11, 1942 and October 21, 1943. In all instances sections of both Fallopian tubes including mucosa were reviewed.

The chief indications for sterilization were, in the order of their frequency: multiparity, severe toxemias of pregnancy, and heart disease.

Of the 50 post-partum patients, 38 were colored and 12 white. In view of the small numbers no attempt was made to segregate the cases by color.

All the patients, with one exception, were operated upon at some time between the second and twelfth post-partum day. The one exception submitted to sterilization on the twenty-fifth post-partum day.

#### Results

The Fallopian tubes of the 17 control cases (cesarean sections) represent organs not exposed to the puerperium. Since upon microscopic examination all were found normal, the assumption appears warranted that before parturition the tubes are not the site of acute inflammatory changes. It is possible, of course, that vestiges of a salpingitis acquired in an earlier period of life might still be visible; such lesions, however, cannot be confused with those to be described and are therefore not pertinent to this study.

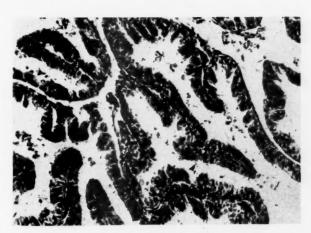


Fig. 1.-Mucosal villi of post-partum Fallopian tube showing normal structure.

Histologic investigation of the sections of the post-partum group revealed that 38 per cent (19 of the 50 cases) were the site of an acute salpingitis. In two instances the inflammation was unilateral, in the remaining 17, bilateral.

The mucosa of the tubes was the stratum most prominently involved. The villi were edematous and infiltrated by polymorphonuclear leucocytes and round cells. In the lumina of most of the organs a small quantity of purulent exudate was present. Nowhere had the inflammation progressed sufficiently to produce accretion of the villi, although in two cases desquamation of the lining epithelium had already made its appearance, a precursor of adhesion formation.

In those tubes which showed the most advanced lesions, aggregates of polymorphonuclear leucocytes were seen in the edematous, hyperplastic muscularis and subserosa. In no case, however, was the peritoneum involved.

Unilateral salpingitis would be difficult to explain had the infection reached the tubes via the lymphatics and blood vessels from the endometrium. The anastomoses of the vessels of the uterus and Fallopian tubes are so abundant that exemption of one tube from the process would appear most unlikely. Extension of the infection by direct extension along the endometrial mucosa to that of the Fallopian tubes could, on the other hand, result in unilateral salpingitis were the lumen of the contralateral side completely blocked. Since in the above two cases the uninvolved tubal segments must be presumed to have been distal to such an assumed obstruction, the surmised block cannot be demonstrated in this material nor, for that matter, in any material other than that obtained by hysterectomy.



Fig. 2.—Edematous mucosal villi of post-partum Fallopian tube infiltrated by polymorphonuclear leucocytes and round cells. Abundant purulent exudate within lumen is characteristic of the more pronounced form of post-partum salpingitis.

The significance of the time interval between delivery and operation in the two groups was investigated. The average interval for those patients free of salpingitis was 5.4 days, for those who developed the lesion, 6.7 days, a difference of 1.3 days.

If it be assumed that a longer interval between delivery and salpingotomy favors the establishment of salpingitis, a comparison of the appropriate subgroups of the two categories should demonstrate a significant difference between them.

Thirteen ( $42.0 \pm 8.8$  per cent) of the nonsalpingitis group were operated upon 6 or more days (midvalue of 5.4 and 6.7 days) after delivery. The corresponding number from the salpingitis group was

14 (73.7  $\pm$  13.4 per cent). The difference between these values (31.7  $\pm$  13.4 per cent) is not statistically significant; however, "the magnitude of this difference is such as to suggest that larger groups of data might show significant differences."

Except for two infants of 8 months' gestation among the non-salpingitis group and 1 of 7 months among the other, all offspring were delivered spontaneously and at term. It is therefore apparent that the term of gestation and instrumentation were not factors in the production of post-partum salpingitis.

The entire group of 50 women, notwithstanding the pathologic diagnosis of acute post-partum salpingitis in 19, were considered to be passing through a normal puerperium. Since the inflammation probably spread along the endometrium to the mucosa of the tubes, the assumption that an unrecognized post-partum endometritis existed must be made. Hendry<sup>6</sup> has demonstrated such a lesion in 10 patients curetted between the fourth and fifth post-partum days, the most constant finding was an extensive infiltration of the endometrium by polymorphonuclear leucocytes.

Franz<sup>7</sup> first and recently Douglas and Rhees<sup>8, 9</sup> have reported that during the early puerperium the lochia of a majority of afebrile women contain "potentially pathogenic organisms." Stander<sup>10</sup> states "There is adequate proof in our experience from a bacteriologic and pathologic point of view, that infection with both an inflammatory reaction and bacteria in the tissues may exist in the absence of any febrile manifestations." Harris and Brown<sup>11</sup> found in their material at Johns Hopkins Hospital that puerperal infections occur five times more frequently in Negro than in white women. In view of the above, it should not be surprising that in this material (76 per cent colored) the incidence of unrecognized post-partum salpingitis should run as high as 38.0 per cent.

Undoubtedly the greater number of post-partum salpingitides are of little importance so far as the course of the puerperium and the future patency of the tubes are concerned. It is not, however, without the bounds of probability, that in some of these cases the lumina may be so distorted or constricted as to impair the fertility of the patient or even produce complete sterility. Franz' concluded that primipara show approximately a 50 per cent greater incidence of moderate temperature elevations during the puerperium than multipara. Such temperature fluctuations are considered to be evidence of puerperal infections. This would indicate, therefore, that the incidence of post-partum salpingitis, in primipara, may be correspondingly higher than in multipara. Those who suffer changes sufficiently great to reduce their fertility to functional or organic sterility would, of course, never have reason for sterilization, and would as a result escape any possibility of systematic pathologic investigation. With this in mind, Rubin's2 discovery of tubal occlusion in 23 per cent of 195 cases of one-child sterility with no apparent cause other than the previous pregnancy should be remembered.

In order to further investigate the etiology of subclinical post-partum salpingitis, a bacteriologic study of a series of Fallopian tubes, similar in all respects to that described above, has been entered upon.

# Summary and Conclusions

- 1. Bilateral tubal segments of 67 patients were histologically examined. Seventeen were removed at term cesarean operation, and 50 at varying intervals during clinically normal puerperia.
- 2. The 17 cesarean section pairs (controls) showed no pathologic lesions.
- 3. Of the 50 post-partum pairs, 38 per cent (2 unilateral) were the site of a mild acute salpingitis.
  - 4. In no case was the salpingitis clinically recognized.
- 5. It is suggested that this hitherto not demonstrated but suspected puerperal salpingitis may in some patients be the cause of tubal obstruction with resultant reduction of fertility, or even sterility.

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# INTERSTITIAL PREGNANCY, WITH REPORT OF A CASE OF FULL-TERM GESTATION\*

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E CTOPIC pregnancy in the interstitial portion of the tube is especially interesting not only because of its infrequency, but also because of the peculiar hazards and obstetrical problems which it creates. Gestation within the cornual portion of the tube was recognized as an entity about two centuries ago. All cases up to 1893 were recognized on the autopsy table. After rupture the sudden alarming symptoms of shock which intervened were treated expectantly with the resultant 100 per cent mortality.

The year 1893 marked a new era in the treatment of this condition. Traub,¹ operating on a case performed a supravaginal hysterectomy with subsequent recovery. In 1875, Fritz² reported 18 cases in the literature; the first American to report on the above condition. In 1896, Rosenthal³ studied, 1,324 cases of ectopic gestation of all types and found 40 cases of true interstitial pregnancy, an occurrence of 3 per cent. In 1914, Waegeli⁴ made an exhaustive study of the subject. He accepted 53 of the 150 cases cited, and reported 2 additional cases. Until that time, 11 cases were operated upon before rupture. In a series of 1,547 cases of ectopic pregnancy collected by Wynne⁵ from several of the larger clinics, there were 18 cases of interstitial pregnancy, an incidence of 1.16 per cent. The total number of cases of interstitial pregnancy reported by Wynne up to 1917 is 91, of which 21 were unruptured. The decade between 25 to 35 years of age showed the greatest number of cases.

Since 1918, there have been an additional 108 cases reported, bringing the total number of cases of interstitial pregnancy appearing in the literature to 199. This covers the period up to July, 1943.

To be classified as true interstitial pregnancy, the gestation sac must lie within the wall of the uterine cornu between the proximal end of the isthmic portion of the tube and its uterine orifice. In the normal uterus, the interstitial portion of the tube is 1 cm. long with a uterine ostium 1 mm. in diameter. It forms an arc upward and convex. The folds of mucosa in this portion are fewer and not so deep as those of the isthmus.

Morbid anatomy and clinical symptoms are dependent to a great extent upon the site of lodgement and direction of the growth of the ovum. Hypertrophy and hyperplasia of the parenchyma of the uterus

<sup>\*</sup>Presented at a meeting of the Brooklyn Gynecological Society, April 14, 1944.

about the gestation sac, coincident with the development of the sac are the factors which determine the gross appearance of the fundus as well as the relationship of the appendages. If the ovum lodges in the uterine ostium of the tube, development of the sac does not result in marked asymmetry of the fundus during the early weeks. If the sac is near the periphery of the uterus, asymmetry of the fundus is an early sign. Growth of the sac occurs in the direction of least resistance, which may be determined by the thickness of the uterine wall. When asymmetrical development occurs, the diagnosis may be made more easily.

Conditions which may show signs similar to those of interstitial pregnancy, are pregnancy in one horn of a bicornuate uterus, cornual pregnancy, a myoma in one cornu, or unilateral cornual abscess.

Irregular bleeding occurred in nearly two-thirds of Wynne's cases. A persistent amenorrhea occurred in the remainder. The latter symptom is an important factor in the differential diagnosis.

According to Polak, interstitial pregnancy may terminate in one of the following ways:

- 1. Death of the ovum.
- Expulsion of the ovum into the uterus in which case pregnancy may terminate into an abortion or proceed as an intrauterine pregnancy.
- Rupture into the peritoneal cavity with death of mother from hemorrhage and shock.
- 4. Rupture into the broad ligament.

Statistics show that the usual time for rupture is during the second and third months. Interstitial pregnancies are very rarely seen after the sixth month. Two cases at almost full term were reported,<sup>7, 8</sup> in one of which a living infant was delivered. Three cases of full-term interstitial pregnancies are recorded in the literature up to the present time.<sup>9-11</sup> This report is, therefore, the fourth case of full-term unruptured interstitial pregnancy, and is probably the only one which went so far beyond term.

## Case Report

G. D., Italian gravida i, 22 years of age entered the Cumberland Hospital on November 8, 1934, with a complaint of an overdue pregnancy and cessation of fetal movements since the first of September, 1934. Her last regular menstrual period was November 23, 1933. Prior to this, her periods had always been regular. She vomited during the early months of her pregnancy. The expected date of confinement was September 1, 1934. During March, 1934, the patient was seized with intermittent abdominal pain and vaginal bleeding which forced her to go to bed. From then on her pregnancy progressed apparently normally. She passed her expected date of confinement without going into labor, but from then on she felt no fetal movements. On October 7, 1934, the patient began to spot, accompanied by occasional cramplike pains. The spotting lasted 3 weeks. Two weeks before admission, the patient was seized with severe, sharp colicky lower abdominal and back pains which

lasted half an hour, not accompanied by nausea or vomiting. There was no vaginal bleeding since one week prior to admission, and no complaint of any headache, dizziness, visual disturbances or epigastric pain.

Her family history and past history were irrelevant.

Physical examination showed a young woman who appeared to be comfortable. The eyes, mouth, throat, neck, heart and lungs were negative. The extremities and reflexes were normal. Abdominal examination showed a symmetrically enlarged ovoid uterus extending from the pelvis to above the umbilicus and into the left upper quadrant, where the head of the fetus could be easily palpated through the abdominal wall because of easily felt overlapping sutures of the skull. No fetal heart was heard. No small parts could be felt.

The patient showed a nulliparous introitus and vagina. The cervix was small, soft and situated high and posteriorly in the vault of the vagina. The external os was closed. Anteriorly to the cervix and just above, about the level of the internal os, a well-rounded, firm and hard mass was felt. The cervix seemed freely movable and also apparently moved independently of the mass. Blood pressure was 124/72.

Urine showed no sugar, albumin or casts. The Friedman test was negative. The blood Wassermann test was negative. P.S.P. test showed 35 per cent excretion after 2 hours. Blood chemistry showed sugar

61.3 mg. per cent, and urea nitrogen 12.1 mg. per cent.

X-ray examination November 9, 1934, showed evidence of a single fetus lying in breech presentation. There was evidence of overlapping of the cranial bones. Subsequent x-ray films on November 22 and

November 29 showed no changes in position of the fetus.

Several attempts to induce labor with castor oil and quinine failed. Three weeks after admission, the patient was examined vaginally under anesthesia. The cervix protruded in the posterior vaginal vault about one inch and felt firm. A uterine sound was easily passed through the cervical os for a distance of about 8 cm. and posteriorly to the presenting part of the fetus. The presenting part was easily dislodged from the pelvis and a rounded mass which was thought to be the uterus could

be mapped out posteriorly to the presenting part.

On December 1, 1934, a laparotomy was performed. A mass about 14 inches in length and 6 to 7 inches in width was found eminating from the left horn of what was an apparently normal uterus. This mass was composed of a dead fetus within a sac, intimately associated with the left tube, the distal end of which was apparently normal. The left ovary contained small cysts. The right tube and ovary were normal. The uterus was located posteriorly to the sac containing the fetus. There were numerous adhesions of the omentum and the small intestines to the sac. The entire sac and the distal portion of the left tube were removed after separation of the adhesions. After suturing the raw surface of the uterus, the latter was observed to have been reconstructed to its completely normal appearance.

Postoperative Course.—During the first 3 days, the patient developed distention of the abdomen with vomiting on the second day. The patient was lavaged through a Levine tube, and the distention subsided. The patient then made an uneventful recovery, being discharged Decem-

ber 20, nineteen days, after the laparotomy.

On January 5, 1935, the patient was seen in the post-partum clinic. She was feeling fine and offered no complaints. The abdominal wound was entirely healed. The cervix was in the axis of the vagina and was not tender. The fundus of the uterus was in the anterior position, in

the midline, normal size and freely movable. Both fornices were free of any induration or masses. Examination two weeks later showed the same findings.

It is of interest to note that about two years later the patient was spontaneously delivered of a full-term living child.

# Pathological Report

Specimen consists of an ovoid saclike structure containing a female fetus measuring about 50.8 by 27.9 by 30.5 cm. The resected surface is represented by a triangular area and corresponds to the caudal end of the fetus in the sac.

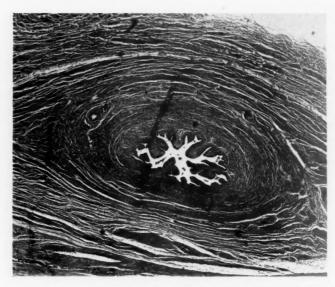


Fig. 1.—Cross section of severed stump of portion of tube showing the characteristic stellate shape of lumen as well as mucosal pattern of this interstitial segment of tube. Note the relatively few folds of the mucosa and the absence of reaction in the mucosa  $(\times 35)$ .

At one angle of the triangular resected area the stump of a tubal structure 1 mm. in diameter, projects from the cut surface. It is the proximal portion of the Fallopian tube. Microscopically, cross sections of this tubal stump show an intact mucosa with rugae characteristic of the interstitial portion of the tube (Fig. 1). There is no decidual reaction in the mucosa, and the inner muscular layer is normal. The outer muscle layer and serosa, however, are both invaded by fetal structure, most of which consists of degenerated placental villi. This layer of tubal wall merges indefinitely with the outer surface of the sac wall and at this level the lumen of the tube is obliterated.

The opposite angle of the triangular area of resection is occupied by a rough brown tissue. Beneath this layer are interlacing bundles of smooth muscle which can be readily identified as myometrium (Fig. 2). Van Giesen stains of this area show extensive fibrous replacement of the myometrium. The rough brown tissue noted in the gross, microscopically, is found to be a small piece of ovarian tissue continuous with a strip of broad ligament.

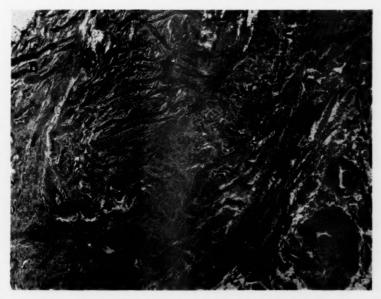


Fig. 2.—Cross section through the triangular area of resection showing denuded myometrium of lateral uterine wall. Note A, the cross sections of branches of uterine artery and B, the interlacing bundles of myometrium along lateral wall of uterus ( $\times 27$ ).



Fig. 3.—Section of the sac wall through the placental attachment showing fibrosed myometrium; A, Merging indefinitely with infarcted placenta; B, containing abundant calcium deposits; C, in the villi  $(\times 11)$ .

The remaining portion of the triangular area of resection (Fig. 3) is composed of numerous large vessels, myometrium and fibrous structure. It merges indefinitely with the deeper, partly calcified placental mass which forms the inner layer of the sac wall. Microscopically, numerous placental villi are found in between bundles of smooth muscle.



Fig. 4.—Fetus and placenta removed from sac. Note short umbilical cord due to loop formed by the latter J, midway between fetal K, and placental L, insertions. Note also macerated condition of the fetus and the extremely large cotyledons L, of the placenta containing large infarcts.

On opening the sac, a full-term, partly macerated female fetus is found compressed by the tension of the sac wall, its extremities in complete flexion. The umbilical cord is shortened by an adherent loop (Fig. 4) at a point about midway between its fetal and placental insertions. The placenta is firmly attached to the caudal portion of the sac and the amnion merges indefinitely with the cephalic end where the sac wall becomes extremely thin. The maternal surface of the placenta shows extremely large cotyledons which contain numerous areas of infarction. The fetus is covered with a large amount of lanugo and is fully developed. The skin is discolored gray-brown and shows beginning maceration.

The microscopic sections of the sac wall at the margin of placental attachment show muscle bundles and scant fibrous tissue merging indefinitely with masses of placental tissue much of which is infarcted. Section through the cephalic and thinnest portion of the sac wall (Fig. 5) shows completely hyalinized structure containing fetal masses which



Fig. 5.—High-power magnification through the thinnest portion of the cephalic end of the sac. Arrows point to masses of fetal syncytium in the outer layers of the sac wall ( $\times 150$ ).

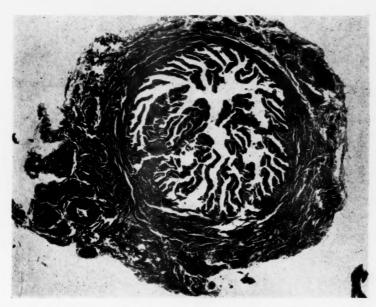


Fig. 6.—Section through distal portion of isthmus of tube. Note the characteristic pleating of the mucosal lining of the distal isthmus of tube. Contrast with similar magnification of interstitial portion of tube shown in Fig. 1.  $(\times 35.)$ 

have penetrated to the very outer surface of the wall. Amnionic membrane can be distinctly discerned as lining the sac. The microscopic sections of the umbilical cord show necrosis and para-umbilical infiltration in the region of the adherent loop and a platelet thrombus occluding the vein at its fetal end.

Accompanying the sac and its contents, there is the distal portion of the Fallopian tube including the fimbria. This portion of tube is normal except for congestion. Microscopically, the structus is characteristic of isthmus and fimbria of a Fallopian tube (Fig. 6).

- Diagnosis: 1. Macerated full-term interstitial tubal pregnancy
  - 2. Thrombosis and adherent loop of umbilical cord
  - 3. Fallopian tube-isthmus and fimbria
  - 4. Segment of ovary-tuboovarian adhesion.

# Summary

- 1. A case of full-term interstitial pregnancy is presented.
- 2. The literature reveals a total of 199 cases of interstitial pregnancy reported up to July 1943.
- 3. Three previous cases of full-term pregnancy have been reported. This report is, therefore, the fourth case of full-term interstitial pregnancy.

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  - 960 STERLING PLACE
  - 414 STERLING PLACE

# LOCAL CHEMOTHERAPY IN THE PROPHYLAXIS OF MASTITIS\*

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M UCH experience has been accumulated on the topical application of the sulfonamide compounds since their introduction as prophylactic and curative agents. The experience of the last few years has shown that oral, topical, or oral plus topical medication with sulfonamides will prevent wound infection. There is no doubt now that infection can generally be prevented in minor laceration involving the skin and subcutaneous tissues or superficial muscle layers, without extensive destruction of tissue by the topical application of sulfonamide compounds.

Though a dearth of experimental and clinical reports on sulfonamides has appeared, these are so conflicting that it is difficult to conclude which of the sulfonamides is the "chosen one" for topical use. Long¹ stated, after reviewing these reports: "When all the factors have been considered, it seems reasonable to choose sulfanilamide as the drug of choice for the prophylaxis and treatment of contaminated and infected wounds."

Where sulfanilamide therapy locally has been started, experience has shown that it is necessary to repeat the local application of the drug at each dressing period if both primary and secondary infection is to be prevented. Local therapy with sulfanilamide should be continued until healing is complete.

That sulfanilamide is soluble in tissue fluids and diffuses readily through living tissue and fairly well through dead tissue was demonstrated by Hawking.<sup>2</sup> He found that it had greater power of concentration and diffusibility; whereas sulfathiazole persisted longer and had higher bacteriostasis, but lower concentration and diffusibility.

Zondek and his associates<sup>3</sup> found that sulfanilamide applied percutaneously was absorbed through the skin of rabbits and men, and suggested that this use of sulfanilamide might serve as an auxiliary method of chemotherapeutic treatment in certain cases.

According to Graves,<sup>4</sup> the combined use of sulfanilamide and sulfathiazole may give better results than either alone; using the sulfanilamide for its ability to go into solution quickly in high concentration and the sulfathiazole because it is more slowly absorbed.

# Topical Application of Sulfonamide Compounds

The success of sulfonamide therapy depends on the physical form in which it is applied and the vehicle in which it is dispersed.

<sup>\*</sup>Presented at a meeting of the Pittsburgh Obstetrical and Gynecological Society, April 3, 1944.

In a series of tests to determine the most suitable vehicle for the sulfonamides, Fuller, Hawking and Partridge<sup>5</sup> found that when sulfanilamide was incorporated into an oily base or an oil in water emulsion, its absorption was much delayed. They also found that incorporation of glycerin or a wetting agent caused little or no influence on the rate of absorption.

Ointments of petrolatum and grease bases are contraindicated aecording to Kalz and Prinz.<sup>6</sup> They believe that ointments of this type coat each particle of the sulfonamide with a nonsoluble substance hindering the local action. Pillsbury, et al.<sup>7</sup> arrived at the same conclusion. "All grease bases (petrolatum, hydrous wool fat or simple ointments) may retain the medicament at the site, but do not allow intimate contact of the agent withthe site of infection; they do not mix with the exudate, and are sometimes removed with difficulty and probably allow increased growth of bacteria under the film of grease."

## Allantoin-Sulfanilamide-Sulfathiazole Ointment

The base for this ointment was prepared without petrolatum or grease. It was water miscible and contained glycerin, triethanolamine, stearic acid and water.

Allantoin 2 per cent, sulfanilamide 5 per cent and sulfathiazole 5 per cent were incorporated in the above base.\* Allantoin, the terminal oxidation product of purine metabolism has been known since 1821. Extracts of comfrey root were used by Macalisters to treat and heal chronic ulcers which failed to respond to other types of treatment. It was determined that the active principle in these extracts was allantoin.

The remarkable success obtained by Baer<sup>o</sup> with his maggot therapy in chronic suppurative infections was manifested by the characteristics of rapid healing of healthy granulation tissue. Robinson<sup>10</sup> definitely demonstrated that maggot secretions contained allantoin and that the application of allantoin seemed to stimulate a local rather than a generalized granulation. Ratner<sup>11</sup> stated that the curative action of surgical maggots in infected lesions was due to allantoin, an excretion of the maggot. On hydrolysis, allantoin yields urea which is responsible for the healing action. Urea has been shown by Olson, et al.<sup>12</sup> to increase the rate of formation of granulation tissue in experimental animals.

Sulfonamide Inhibitors.—It was noticed by some of the earlier workers with the sulfonamides that certain substances inhibited their bacteriostatic action. These sulfonamide inhibitors, it was suggested, were produced by the organisms.

Tsuchiya, et al., 13 had demonstrated that the mere presence of urea antagonized the sulfonamide-inhibiting action of at least one of the end products of protein catabolism. Strakosch and Clark 14 found that a mixture of urea and sulfathiazole was more beneficial than sulfathiazole

<sup>\*</sup>Allantomide and Sulfathiazole—made by The National Drug Company, Philadelphia, Pa.

alone; complete epitheliazation of lesions was accelerated by from one to five days by the use of sulfathiazole-urea ointment.

The efficacy of allantoin-sulfanilamide ointment in the therapy of surgical infections, was demonstrated by Veal and Klepser.<sup>15</sup> They concluded: "The substitution of allantoin-sulfanilamide ointment for pure sulfanilamide powder allows a prompt resumption of the normal healing process and at the same time maintains a clean wound."

Wallersteiner<sup>16</sup> found that the main compounds that were active in sulfanilamide-fast organisms, were sulfanilamide-urea and to a lesser degree, sulfanilamide-allantoin. These compounds also showed the curious phenomenon of increasing the rate of cell growth and the cell migration of the fibroblasts toward them.

Sensitization.—In recent months reports have been appearing relative to reactions in tissues, and sensitization to sulfonamides by the local application. A comprehensive review of the subject by Cole<sup>17</sup> caused him to issue a warning that sulfonamides should not be administered locally for more than five days because of the danger of sensitizing the individual.

When one considers the enormous volume of sulfonamides which has been produced and consumed as compared to the number of reported drug reactions, it would seem that the sensitization of patients would be more apparent than real.

The purpose of the clinical study undertaken and herein reported was to determine the merits of a combination of allantoin-sulfanilamide-sulfathiazole mixed in a water-miscible base for chemotherapy in the prophylaxis of mastitis.

Procedure.—During the year 1943, each obstetric patient admitted to my service at the Greene County Memorial Hospital, who nursed her infant, the mothers of premature and stillborn being excluded, was treated as follows: within four hours after delivery, the patients' breasts were washed with soap and water, rinsed and blotted dry. The nipples were cleansed with 70 per cent alcohol and dried. The allantoin 2 per cent, sulfanilamide 5 per cent, sulfathiazole 5 per cent ointment was applied with gentle massage to the nipples and areolae, leaving only a thin film on the surface. A sterile piece of gauze was applied to the nipple area and held in place by a supporting cloth binder. An individual tube of the ointment was used for each patient.

Before each nursing period, the mothers' fingers were cleansed with 70 per cent alcohol and the nipple area cleansed with boric acid solution. Following the nursing period, the nipples were again cleansed with boric acid solution, dried and the ointment applied as previously described. A sterile gauze covering and supporting binder were used.

This treatment was continued until the patient was discharged from the hospital, usually on the eighth or tenth day.

Results.—In all, 212 consecutive patients were treated. There were no signs of local or systemic drug reactions observed in mothers or infants. Three patients developed mastitis while in the hospital, and two of these subsequently developed breast abscesses after discharge. These will be discussed in detail later.

Of the 212 patients, 17 or 8 per cent showed a morbidity, i.e., a temperature of 100.4° F. or over on two successive days, excluding the first 24 hours. The cause of morbidity was broken down as follows: Five or 2.3 per cent showed an endometritis; 3 or 1.4 per cent showed a mastitis, as previously mentioned; 3 or 1.4 per cent showed an infection of the episiotomy wound; 2 or 0.9 per cent showed an upper respiratory infection. There was one case of each of the following: Poro cesarean section, laparotrachelotomy, pyelitis with an associated nephrolithiasis and post-partum atelectasis.

Of the three patients who developed mastitis, one subsided completely and breast feeding was resumed. The other two seemingly subsided but subsequently developed abscesses after discharge from the hospital. All

were primiparas.

The first patient developed a fissure in the left nipple on the fourth post-partum day and on the sixth day, an acute interstitial mastitis in the upper lateral quadrant, was evident. Sulfanilamide-sulfathiazole-allantoin ointment was continued, hot stupes were applied locally, breast feedings were stopped for 48 nours and sulfadiazine was given by mouth. The infection subsided in 36 hours.

The second patient had marked inverted nipples and nursing should probably not have been attempted but a trial was deemed advisable. Acute mastitis developed on the seventh day, subsided under above treatment and nursing was resumed. However, she came back to the hospital on the nineteenth day, when an abscess was incised and drained.

The third patient was delivered of a female infant which had an extensive congenital atelectasis and later a pneumonia of the left upper lobe. This was confirmed by x-ray. The infant lived four days and was out to breast but once. The right breast was used and this one became infected. The ointment was applied but twice to the right breast and once to the left. An acute mastitits developed on the sixth post-partum day and had apparently subsided by the tenth. However, the patient returned on the eighteenth post-partum day when an abscess of the right breast was incised and drained. The pus in both instances looked to be that caused by the staphylococcus.

#### Discussion

The first patient developed a mastitis secondary to a small fissure. She responded well to local and general treatment.

In the second patient who possessed such marked inverted nipples, the ointment obviously was not effective. Nursing was instituted and continued here with the full knowledge of what might result. A genuine trial of the ointment was deemed advisable and warranted.

In the third patient, the sick infant should not have been put to breast, not only for its own sake, but because of the possibility of introducing infection into the nipple. The ointment should have been used continuously for at least five days.

### Conclusions

1. The local application of allantoin 2 per cent, sulfanilamide 5 per cent, sulfathiazole 5 per cent in a water-miscible base is a safe pro-

cedure, and in this number of cases caused no local or systemic reaction to mother or baby.

- 2. Sensitization of the patient is a possibility as reported by Cole, but the small amount of drug undoubtedly absorbed systemically makes this seem remote.
- 3. Markedly inverted or potentially infected nipples should be treated with the ointment but nursing should be prohibited.
- 4. While it cannot positively be asserted, it is felt that the use of this allantoin-sulfanilamide-sulfathiazole ointment, as described herein, helps to prevent mastitis. Certainly its use is more rational than the ointments used heretofore.

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## CHOREA GRAVIDARUM: WITH THE REPORT OF A CASE

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To OBSERVE a patient with chorea gravidarum is an unique and unforgettable experience. It is unique in that cases are seldom seen more than once in the entire practice of any obstetrician, if at all. The reported incidence is widely divergent. Berg² states that, at the St. Louis City Hospital, only 2 cases in 12,000 deliveries were recorded during the course of fifteen years. At the John Gaston Hospital, Memphis, a teaching institution, no case has been recorded in over 28,000 deliveries covering a period of twenty-eight years. Willson and Preece,¹² however, estimate the incidence as 1 in 2,500 deliveries. It is an unforgettable experience in that the clinical picture which it presents is perhaps the most distressing of all the complications of pregnancy. Further, although a well-recognized entity early in the nineteenth century, the condition still compels interest because of its much disputed origin, the variability of its manifestations and the number of views as to their interpretation, as well as the problem of its management.

Concerning the origin of chorea gravidarum, opinion is largely divided between the theory that it is a Sydenham's chorea appearing in pregnancy and is therefore of an infectious nature, and the theory that it is due to toxemia. An infectious etiology is apparently established in a number of cases by a history of rheumatic fever or scarlet fever in childhood, and frequently an early chorea. In this group, arthritis and endocarditis or other cardiac disease is often associated. An early onset and the fact that the chorea may recur with successive pregnancies is likewise in favor of this origin. On the other hand, many cases are reported in which there is no history of infection or earlier chorea, and no evidence of a heart lesion; in these, the symptoms are believed by many observers to be a manifestation of toxemia. A toxic origin is also suggested by an absence of fever, a prompt subsidence of symptoms after termination of the pregnancy, and frequently other signs of toxemia.

Unquestionably, there is also a strong element of neurosis in chorea gravidarum. This element is probably primarily constitutional, and is aggravated by emotional disturbances pertinent to the pregnant state. Whitmore<sup>11</sup> believes that fatigue due to increased emotionalism is a significant factor in young primipara. Early environment may also have some influence. Weigner<sup>10</sup> reports that Gerty and his associates, in a seven-year study of 150 children with chorea, together with a control group who had rheumatic fever but no chorea, found that those with chorea came from families wherein there was a great deal of emotional turmoil and social maladjustment. This history was not given by those who had rheumatic fever without chorea. Weigner also quotes Sahli as

having pointed out that movements of the fetus are choreiform in nature; that muscle movements become orderly and purposeful after birth; and that perhaps this constitutional tendency is an expression of failure of normal development. One may thus explain the cases of chorea wherein only certain muscle groups are affected. It is Weigner's opinion, therefore, that chorea gravidarum should be regarded as an expression of a defective constitutional "anlage," which may be precipitated by various factors, as infection, toxicity or nervous influences originating from acute emotional trauma and psychic conflict relating to pregnancy. The likelihood of a neurotic or psychic factor is supported by many reports of cases in which the attack has been preceded by worry or immediately induced by some shocking or frightening incident.

Pathologically, chorea gravidarum is a low-grade encephalitis. Several investigators have reported finding congestion and hemorrhage in almost every part of the cerebrum in autopsy studies. The movements are conceded to have their stimulus, however, in the basal ganglia, wherein the process is most severe and may be both degenerative and inflammatory in character. Brian and Gerundo³ reported a case in which, in addition to the brain, the liver, kidneys and spleen presented degenerative and inflammatory changes. There were no signs of past or present endocarditis. From these findings, which bear a close resemblance to those encountered in fatal eclampsias, they believe their case was toxic in origin. The onset of the symptoms during the sixth month of pregnancy and the clinical course bore out this opinion. They conclude that a distinction between the toxemic and rheumatic types may be made by the clinical course and nephrohepatic lesions.

Chorea gravidarum appears to have a predilection for young women, the average age being between twenty and twenty-five years. Rarely is it seen in patients beyond thirty years of age. As Berg² has pointed out, it is perhaps partly because of this age incidence that primipara are more often affected. It may, however, appear for the first time in multipara. The patient observed by Brian and Gerundo³ first had chorea during her second pregnancy, at the age of thirty-five. Not infrequently, moreover, the movements appear in more than one pregnancy. Scheftel's³ patient had chorea with three successive pregnancies, and French and Hicks¹ describe a case in which chorea complicated the first pregnancy, was absent in the three succeeding ones, and recurred during the fifth.

Both the maternal and fetal mortality are variously quoted. In a study of 951 choreic pregnancies in 797 patients, Willson and Preece<sup>12</sup> found the maternal death rate to be 13.1 per cent for those delivered spontaneously at term, whereas it was 33.3 per cent for those terminated artificially. These were the more severe cases; of the patients with the mild forms who were delivered spontaneously at term, the rate was only 1.9 per cent. The fetal mortality is generally reported as approximately twice that of the mother. DeLee<sup>5</sup> estimated the maternal mortality

as 20 to 30 per cent, and the fetal mortality as over 50 per cent. According to Royston,<sup>8</sup> pregnancy in a choreic individual is not necessarily serious, whereas a chorea appearing for the first time only after conception is always of grave import, and failure to differentiate these two conditions probably explains the marked variation in mortality figures.

With few exceptions, infants delivered at term are normal. DeLee<sup>5</sup> states that an occasional infant is born with chorea. In reported cases, abnormalities, when present, were confined to the head and spine. Two of the infants in Willson and Preece's<sup>12</sup> series were born with spina bifida and hydrocephalus, and a third had hydrocephalus alone. Campbell<sup>4</sup> reported a case in which the patient gave birth to a baby with a marked microthalamus and facial asymmetry. Scheftel's<sup>9</sup> patient was delivered of an infant with the Klippel-Feil syndrome at her third pregnancy complicated by chorea.

The symptoms of chorea usually have their incipiency during the early months of gestation, though in a number of cases they do not appear until the second or third trimester, and in a few not until after delivery. They are generally mild in the beginning, consisting merely of an intermittent coarse twitching or numbness of a few muscle groups, such as those of one hand and arm, or one upper and lower extremity of the same side. The left side is most often affected. In the majority of cases, the movements remain mild in character and cease with sleep. In others, they increase in severity and extent; with the approach of the puerperium practically all the muscles of the body may be continuously and violently contracted, necessitating forceful restraint of the patient in bed. The muscles of the face and neck are usually involved, causing impairment or total loss of the power of speech and deglutition. In such cases, the prognosis is grave indeed. The patient is not only soon exhausted from the constant movement and loss of sleep, but suffers from malnutrition incident to the difficulty in feeding.

Personality changes are commonly associated with the choreic symptoms, occasionally preceding them by weeks or months. At first, these changes may consist only of an irritability, or a depression or melancholia, and often are associated with a more or less severe headache. As the movements increase, the psychic symptoms also increase until, in the later stages of the disease, the patient may have hallucinations, or may even exhibit a complete mental incapacity.

The temperature and pulse rate may or may not be elevated throughout the course of the illness. When present in the more severe forms, and especially when associated with pronounced psychic manifestations, fever adds materially to the gravity of the prognosis.

The diagnosis of chorea gravidarum is usually obvious almost at a glance. In the early stages of pregnancy, one may need to make a differentiation from hysteria or a pure neurosis. The differentiation from hysteria should not be difficult by the rhythmical movements of the latter, in contrast to the incoordinated and irregular movements of

chorea. Since a strong neurotic element is often present in chorea, a neurosis may be less easily distinguished. Flamma<sup>6</sup> reported a case of supposed chorea in which he feigned an interruption of pregnancy and the patient promptly recovered. Such cases, however, are rare.

The clinical course is not unlike that of Sydenham's chorea. A large proportion of patients recover before term, especially those with a mild form of the disease. If the patient comes to term, the movements increase during labor, but usually begin to subside almost immediately after delivery and disappear completely within a few weeks. In some cases, however, recovery is slow, requiring months.

When feasible, conservative treatment may bring about a quiescence of the movements. Mild cases are often amenable to quiet and rest, wholesome food, and the use of bromides and barbiturates. Several authors have reported a definite response to one or more small transfusions of blood from a healthy pregnant woman, as suggested by Albrecht. This treatment is probably efficacious in those cases wherein toxemia plays a prominent role.

In severe cases, termination of the pregnancy is advisable. The sooner this is done, the better, as the mortality is exceedingly high when operation is delayed. The presence of fever is an added indication for intervention. Abortion is regarded as the procedure of choice, though cesarean section is usually preferable if the pregnancy is well advanced, or the choreic movements become violent.

## Case Report

Mrs. T. C. D., aged 20 years, was first observed during the fourth month of her first pregnancy. Her family history was irrelative insofar as mental or physical disease was concerned. Her mother had died of tuberculosis and her father had been killed in an accident while she was still a child, and she had been reared by an aunt. Aside from these tragedies, her childhood had not been unhappy. She had had whooping cough and measles, but gave no history of rheumatic fever, scarlet fever or chorea. Her menstrual history was normal. She had been married to a medical student for almost two years, and stated that she was happy in her marriage. The only other finding which threw any light upon the condition was the fact that she had been working rather strenuously in a nursery school for more than a year, and was considerably fatigued as a consequence.

Her symptoms had begun two months previously, with an intermittent numbness in her left hand, arm and shoulder. At the time of her first visit, she was experiencing little inconvenience other than some difficulty in combing her hair and picking up objects. Believing this might be due to malnutrition, she was given vitamin B<sub>1</sub>. Within a short while, however, the left lower extremity became affected and the symptoms increased in severity, until both the upper and lower left extremities were involved in clonic and sometimes tetanic contractions. At the same time, choreic movements appeared in her forehead and left upper lip. The spasmodic contractions were now more frequent, and were aggravated by mental or muscular effort.

Coincident with these physical manifestations, it was observed that the patient was exceedingly nervous and easily upset, and that her entire personality was undergoing a change. Normally of a cheerful disposition, she became depressed and manifested a desire to be alone and in the dark. She complained, also, of a crescendo type of temporal headache, sometimes unilateral and sometimes bilateral. She slept poorly, had little appetite, and appeared emaciated. Her weight had not changed, however, probably because of the fetus. At times she had a temperature of 99.5° F. to 100.5° F., and a pulse rate of 96 to 100. She had not experienced any dizziness, vertigo nor tinnitus, nor had she had any nausea, emesis or other gastrointestinal disturbances during pregnancy.

The patient was at this time examined by a psychiatrist, though nothing was found to account for her symptoms. A physical examination by an internist failed to reveal any foci of infection, and aside from an increase in heart rate, there was no cardiac abnormality. The sedimentation rate was elevated, but not to a degree which would indi-

cate a previous rheumatic fever.

Despite practically constant rest in bed, a high vitamin diet, and sedation to promote sleep, the symptoms continued and gradually increased until, during the sixth month of pregnancy, they suddenly became quite severe. On returning home one afternoon, her husband found her alternately sitting up and lying down in bed, crying, and in a state of constant and violent motion. The psychiatrist who had examined her previously was called, and recommended termination of the pregnancy. The patient was brought to our office the following day. She was still crying, her facial muscles were twitching, and it was obvious that all the choreic movements had become materially worse since her last observation. Physical examination disclosed increased reflexes over the left half of the body, and choreiform movements of the left arm and shoulder and left leg, with a bilateral involvement of the eyes, tongue and masseter muscles. There was also a beginning chorea of the right half of the body. Sensation appeared normal. Her pulse rate was 72, blood pressure 103/56, and temperature normal. In view of the obvious spread and increased violence of the contractions, together with the progressive mental changes, interruption of the pregnancy was considered advisable. Since the patient was in the sixth month of gestation, a cesarean section was performed.

On awakening from the anesthetic, the patient stated that she felt normal and sane again, and that the previous month was practically a blank in her memory. During the three days immediately following operation, the contractions were exaggerated, but thereafter began to subside and had practically disappeared by the time she left the hospital, at the end of two weeks. So far as the chorea is concerned, she has had no further trouble. A few weeks after operation, however, she developed generalized joint pains, necessitating treatment by heat and massage.

#### Comment

This patient presented the typical clinical picture of chorea gravidarum. The case is unusual in that we were unable to determine definitely the cause. The appearance of the symptoms during the first trimester of pregnancy, and the lack of organic disturbances seemed to rule out toxemia as the etiologic factor. We are convinced that

fatigue was a strong influence and, despite the clinical history and the absence of a heart lesion, are inclined to believe that either the attack of measles, or an unsuspected mild rheumatic fever in childhood was primarily responsible. The early onset, the intermittent low-grade fever, and the attack of acute arthritis after recovery from the operation support this view.

## Summary

1. Chorea gravidarum is a rare disease which affects chiefly young primipara. It is also observed in multipara, however, and occasionally recurs with successive pregnancies.

2. Pathologically, it is a low-grade encephalitis, apparently being precipitated by the toxemia of pregnancy, or originating in an earlier infectious disease, such as rheumatic or scarlet fever. A defective constitutional anlage is suggested as a fundamental requisite, and other influences, including fatigue, heredity and environment, are often signif-

3. The disease is distinguished chiefly by choreiform movements and mental changes.

4. The majority of cases are of mild degree and subside under conservative treatment. Others become severe, necessitating termination of the pregnancy. The origin of the symptoms is obscure, though it is believed that a previous infection was the underlying factor.

5. A case of progressive chorea gravidarum is presented, in which cesarean section was performed during the sixth month of gestation.

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## **VOLVULUS COMPLICATING PREGNANCY\***

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THE first report of volvulus complicating pregnancy appeared in the literature in 1885. At that time, Braun, in Germany, reported a case of volvulus of the sigmoid colon complicating pregnancy at term. His patient died and the diagnosis was made at autopsy. Since that time there have appeared seventy-six reports of this condition. We wish to add two cases to this series, both occurring in the same patient and in succeeding pregnancies, the first in 1941, and the second in 1943. We have also attempted to collect all reported cases since 1931 when they were last summarized by André Charles Lambert. From time to time several investigators have, to an extent, collected the cases on record. König in 1922 and Radaeli in 1928 presented partial summaries. The most complete collection was presented in 1931 by Lambert of Paris in his Doctor's Thesis. We have been able to find only three cases that he missed: (1) Cattell, 1891; (2) Green, 1912; (3) White, 1914.

Lambert's excellent and very complete report in 1931 consisted of sixty-one cases and we have found thirteen since then plus the three he failed to include. Of these sixty-one, he found that twenty-nine cases occurred in the sigmoid, sixteen in other parts of the large intestine, and sixteen in the small intestine.

The eighteen cases which we will add are localized as follows: twelve in the sigmoid, three in the large intestine other than sigmoid, and three in the small intestine. It is most surprising that of the total number of cases only four have been reported in the United States: (1) Cattell, 1891; (2) Flower, 1912; (3) Green, 1912; (4) Kornfeld and Daichman, 1934. Our cases therefore become the fifth and sixth reported in this country.

#### Report of Cases

This patient, H. J., was an eighteen-year-old colored female, a primigravida, who was first seen in the obstetrical outpatient clinic of the University of Maryland School of Medicine on April 23, 1941. She was found to be fourteen to sixteen weeks pregnant, and her estimated date of confinement was October, 1941. She was given antiluetic therapy and her ante-partum course was normal until August 1, 1941. At that time, when the patient was twenty-four weeks pregnant, she developed nausea, vomiting and abdominal pains. She was seen in the accident room on August 6, 1941, with the above complaints, and was treated unsuccessfully with enemas. She was sent home and was seen again the

 $<sup>^{*}\</sup>mathrm{Read}$  at a meeting of the Obstetrical and Gynecological Section of the Baltimore City Medical Society, January 14, 1944.

following day at which time castor oil and another enema were prescribed with no results. On August 8, 1941, the patient returned to the accident room with signs of partial intestinal obstruction and was admitted to the obstetric service. She was treated with intravenous fluids, enemas, and a rectal tube without relief. The blood chemistry and blood picture were normal except for a hemoglobin of 50 per cent.

The patient did not improve and on August 9, 1941, an exploratory laparotomy was done, under spinal anesthesia, through a low left paramedian incision. An obstructing lesion was demonstrated in the pelvis that was described as "giving the sensation of a twisted towel." When the dilated descending colon was delivered through the wound, the condition was found to be a volvulus twisted two and one-half times in a counterclockwise direction. When this was reduced, a large amount of gas was expelled through the previously inserted rectal tube and the markedly distended colon collapsed. The wound was then closed in the routine manner and the patient withstood the procedure fairly well. She received large doses of corpus luteum substance for the first postoperative week, and was discharged to the prenatal clinic on August 24 1941, in good condition.

The patient went into labor spontaneously on October 19, 1941, some two months later, and was delivered of a full-term living child, weighing 5 pounds 8 ounces by breech extraction. The post-partum course was entirely normal.

There is no further record until January 6, 1943, when she presented herself at the prenatal clinic, and was found to be again pregnant, duration twelve weeks.

The second prenatal course was uneventful until April 11, 1943. At that time, when she was twenty-eight weeks pregnant, she was seen in the accident room, her complaint being abdominal pain and severe constipation of five days' duration. Examination revealed the uterus to be well above the umbilicus and freely movable. The upper abdomen was distended but not tight, and readily showed the pattern of a markedly dilated transverse colon. Enemas were ineffectual. A flat film of the abdomen revealed no pathologic condition other than the markedly distended colon. The patient told us that she had been operated upon in 1941 for 'locked bowels,' and after her old chart was consulted the diagnosis was readily made.

The operation was under spinal anesthesia through the previous left paramedian sear. Again the sigmoid was found to be twisted two times in a counterclockwise direction. The mesentery of the descending and sigmoid colon was markedly lengthened and the gut was four to five times its normal caliber. The colon was delivered and untwisted two complete turns. The gas was expelled through the previously inserted rectal tube, the colon collapsed, and the abdomen was closed. The patient was given large doses of corpus luteum substance both before and for several days after this operation. The postoperative course was uneventful, and she was discharged to the prenatal clinic on April 28, 1943.

She remained symptom free until May 16, 1943, when she again returned to the hospital complaining of abdominal pains, distention, nausea, and severe constipation of forty-eight hours' duration. Examination revealed a pregnancy of thirty-six weeks and the same findings as before, and repeated efforts to reduce the volvulus with enemas with

the patient in shock position were unsuccessful. At this time the question of interrupting the pregnancy instead of operation was considered but was discarded.

Large doses of corpus luteum substance were given pre- and postoperative, and the operation was again through the old left lower scar and under spinal anesthesia. The descending and sigmoid colon were posterior to the enlarged uterus and they were delivered after considerable difficulty. The sigmoid was twisted one and one-half times in a counterclockwise direction and was reduced and decompressed as previously. However, the colon and its mesentery were markedly edematous and the tissues were in much worse condition than at the previous operation.

The following morning the patient went into labor and her membranes ruptured at 2:30 p.m. At 3:25 p.m. she was delivered under gasoxygen anesthesia, of a thirty-six-week living male child, weight 4 pounds 11 ounces by breech extraction.

The postoperative and postpartum courses were uneventful and the patient was discharged in good condition on June 10, 1943. The child was kept in the premature nursery.

It was planned, at the time of discharge to bring the patient back after the uterus had become involuted and the tissues of the intestinal tract had returned to normal; give her a course of sulfasuxidine, and then resect the redundant colon and do a primary anastomosis. However, this was not to follow, because on June 21, 1943, five weeks following delivery, and eleven days following discharge, the patient again presented herself at the hospital complaining of colicky abdominal pains and of severe constipation for thirty-six hours. Again the abdomen was distended and the pattern of the colon was readily seen on the abdominal wall. Enemas being ineffectual, the abdomen was opened for the fourth time at the same site. On this occasion, the volvulus was at a higher level in the sigmoid and was rotated one and one-half times in a clockwise direction. In other words, the colon was rotated in the opposite direction from the three previous times. Following Pomeroy sterilization, a Mickulicz procedure was done and about forty-five to fifty centimeters of the redundant sigmoid and descending colon were resected. The clamp was removed on the fourth postoperative day and the colostomy functioned satisfactorily. The spur was crushed while the patient was making her usual uneventful recovery. The patient was discharged on July 23, 1943, with the colostomy still functioning, but she was also passing fecal material per rectum.

The colostomy did not close spontaneously and the patient was readmitted September 1, 1943. The spur was crushed more deeply and on September 13, 1943, the colostomy was closed. The wound developed a slight subcutaneous infection but the patient was discharged in good condition September 30, 1943. At the present time both mother and baby are in good health.

## Discussion

A statistical study of the cases we have collected shows that age apparently exerts no influence on the disease. The cases range from eighteen to forty-one years. Under twenty years—two cases; twenty-one to thirty years—seven cases; thirty-one to forty-one years—six

cases. Three reports did not state the patients' ages. The greater number of cases under thirty years, of course, is due to the age group of pregnancy.

Three of the patients were primigravidas, twelve were multigravidas, and three authors did not report the parity. Thus it would appear that multiparity of itself predisposes to volvulus, possibly because of relaxation of the abdominal wall musculature.

At what stage of pregnancy is volvulus most frequent? Lambert states that he found the greatest number at term or during labor. We have found our cases distributed as follows: first trimester—one case; second trimester—four cases; third trimester—ten cases; post partum—four cases. This totals nineteen, because in her second pregnancy our patient had both ante-partum and post-partum volvulus. It is rather interesting that the greatest incidence should be at a time when the abdomen is so distended by the pregnant uterus that torsion of abdominal contents would seem most difficult. On the other hand, Spence states that, "In view of the rapid change of position of the intestine after delivery of a full-term child, it is surprising perhaps that volvulus does not happen more frequently immediately post partum."

The etiology of volvulus in pregnancy is not well known, a demonstrable cause being present only occasionally. Cattell's case followed an old ectopic pregnancy which had become attached to the small intestine and thus torsion was initiated. There are occasional cases of improper rotation of the gut in the course of development and the enlargement of the uterus is sufficient to start the torsion as reported by Donald. In the pelvic cases there is almost always an abnormally long mesocolon, without which torsion cannot take place. Some patients give a history of trauma or strain; however, as a cause, this probably should be discounted. One patient reported by Lambert had a previous history of salpingitis and several patients gave histories of persistent constipation over a period of days, weeks, or years.

The degree of torsion varied from 135 to 800 degrees. While torsion may be in either direction, there seems to be a greater incidence counter-clockwise. The condition of the intestines may be any state between slight engorgement and gangrene, depending upon the duration of the volvulus and the amount of strangulation. Peritoneal bands have been responsible for instituting torsion in a few cases.

The symptoms of volvulus complicating pregnancy, like uncomplicated volvulus, are those of intestinal obstruction. Usually the patient gives a history of varying degrees of constipation for several days. This is followed by abdominal pain which is colicky in nature and becomes progressively severe. Vomiting is a variable symptom, depending upon the location of the volvulus. When it is in the small intestine, vomiting is early and protracted; while in the large intestine volvulus, vomiting is not a prominent symptom and usually develops late. Enemas are usu-

ally ineffectual in the colonic type while they are effectual in the small intestinal variety. This fact is often misleading in diagnosis. Examination of the abdomen usually will reveal a marked distention of the intestine above the volvulus. Abdominal tenderness is not a consistent finding, and when present, is usually generalized. Temperature and pulse depend upon the patient's general state of hydration, toxicity, and peritoneal irritation. The post-partum cases are particularly perplexing in the presence of post-partum infection where the classical signs of obstruction are frequently present, but they subside under treatment for the infection and purgation. The signs are most clear when the pregnancy is early. Fluid in the peritoneal cavity is rarely demonstrated although it is usually present.

The diagnosis of intestinal obstruction is usually fairly simple, but to state that it is due to volvulus is a very different matter. This is especially true in the presence of a well-advanced pregnancy. Masses other than the uterus are difficult to palpate. This is not particularly essential, however, for the important thing is to make the diagnosis of obstruction, and to take proper steps to relieve it. Review of the cases reported reveals few instances in which the diagnosis of volvulus was made before operation or autopsy.

The prognosis is to be viewed from two points: that of the mother and that of the child. We have but three cases involving the small intestines and hesitate to draw conclusions in this group. In the large intestine group, however, there are fifteen cases. Here the maternal mortality was 26.33 per cent (4 deaths). (1) Green, 1912, sudden death due to peripheral vascular collapse twelve hours postoperative; (2) White, 1914, patient died of peritonitis six days following resection of gangrenous cecum and ascending colon; (3) Kornfeld and Daichman, 1934, patient died about two weeks postoperative of peritonitis, following resection of gangrenous sigmoid; (4) Rose, 1941, patient died post partum, unoperated, diagnosis at autopsy. The fetal mortality in this group was the same as the maternal, 26.33 per cent. This includes one patient who died undelivered.

If, however, we examine only cases operated upon early where resection was not necessary there is only one death, Green's patient who died of shock. In this group one child was born dead and one was undelivered.

Thus it appears that the time of operation bears a great influence on the prognosis for both mother and child. There were fifteen laparotomies with three deaths, 20 per cent mortality. Three patients were not operated upon and all died, 100 per cent mortality.

There is only one treatment for this condition, namely, surgical. The obstruction must be relieved and reduction is the only way to accomplish relief of the obstruction. It would seem that the best results are obtained when the volvulus can be merely reduced and the pregnancy not

disturbed. This is true regardless of the duration of the pregnancy. Our patient was treated in this way and we delivered a living child at each pregnancy. Fear of rupture of the abdominal wound, if labor intervenes shortly after operation, probably has little foundation. The administration of large amounts of corpus luteum substance both before and after operation may prevent the onset of labor. This treatment and therapy apparently permitted our patient to continue her pregnancies on both occasions. The first pregnancy was carried to term. During the second pregnancy, labor was again prevented following the first operation at twenty-eight weeks. The therapy failed, however, the second time at thirty-six weeks.

# Summary and Conclusions

- 1. Presentation of eighteen cases of volvulus complicating pregnancy (not previously reported) including two original cases.
- 2. Total cases reported are localized as follows: small intestine—19 cases; large intestine other than sigmoid—19 cases; sigmoid—41 cases.
- 3. Presentation of a patient who has been operated upon four times for volvulus of the pelvic colon associated with two pregnancies.
- 4. The patient did not go into labor following the early operations (during her sixth month in 1941, and during the seventh month in 1943). Large doses of corpus luteum substance were given before and after operation. However, labor followed the operation at the thirty-sixth week of gestation despite the same medication.
- 5. Volvulus occurring with pregnancy is a very interesting and a very rare complication. There have been only six cases reported in the United States and seventy-three cases reported abroad.
- 6. The etiology of this complication is not clear and the only relatively consistent pathologic finding is in elongated mesocolon in those cases involving the sigmoid colon.
- 7. The diagnosis of volvulus is very difficult but intestinal obstruction is usually quite apparent.
- 8. The symptoms are those of obstruction depending upon the location of the blockage.
- 9. The prognosis for mother and child is good if early diagnosis and treatment are available. Otherwise, the prognosis is poor for both.
- 10. The treatment is surgical relief of the obstructing volvulus. Termination of pregnancy does not appear to be indicated.
- 11. It would seem that large doses of corpus luteum substance preand postoperatively are of considerable help in allaying the sensitivity of the uterus in the first and second trimesters, when laparotomy is done, but of doubtful value in the third trimester. This has been our experience in several other instances when abdominal operations were necessary during pregnancy.

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## PREGNANCY AND DIABETES

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DIABETES as a complication of pregnancy is encountered somewhat infrequently; however, during the past decade about sixty articles have appeared in the American and British literature on the subject. This alone denotes roughly the importance attached to pregnant diabetic patients by both the obstetrician and the internist.

The purpose of this communication is to present an analysis of the diabetics who have undergone confinement at the University Hospitals of Cleveland during the past eleven years, and to review briefly certain important features relative to the subject in the recent literature.

Forty-four diabetic pregnancies have been delivered in this hospital during the period from January, 1933, through March, 1944. Four cases in which the diagnosis of diabetes was questionable from information obtained from the records were not included in this series.

The age distribution was roughly that of a normal group of parturients. The youngest patient was 17 years of age and the oldest was

43. Thirteen of the group were primigravidas.

It is a well-recognized fact that the occurrence of stillbirths in diabetics is high. The time of fetal death is frequently after the thirty-sixth week of gestation. Kramer<sup>1</sup> found that 60 (25 per cent) of 238 cases collected from the literature resulted in stillborn infants. In our series there were seven (16 per cent) stillbirths. There were five neonatal deaths. Translating these figures into terms of living infants discharged from the hospital, usually between the tenth and fourteenth days of life, the survival incidence was 73 per cent. Ten of the multip-

aras had had a total of eleven previous stillbirths.

Nine infants (20 per cent) in this group of cases weighed over 4,000 grams. Speculations as to the cause of the increase in infant weight in diabetic mothers has been thoroughly discussed in much of the literature. Maternal hyperglycemia was the favorite explanation of the occurrence of the so-called "giant" infants of diabetics until the work of Snyder and Hoopes. Overdeveloped offspring in animals were produced by these investigators by the injection of prolan. This work and that of others suggests that the correct explanation is on the basis of hormonal derangement. It is of interest to note five of the nine infants of excessive size in this series were from mothers whose hyperglycemia was mild to the degree that it could be controlled by diet alone.

Congenital anomalies are said to be found more frequently in infants born of diabetic patients. In this group there was only one infant which demonstrated a congenital defect; this infant dying from congenital heart disease in the third day of life. White<sup>5</sup> reports seven (4.2 per cent) abnormalities in a group of 166 babies from diabetic patients.

The most common complication encountered in pregnant diabetics is pre-eclampsia. In a study of 43 pregnancies in 38 diabetics, Allen<sup>6</sup>

found that 70 per cent showed one or more signs of toxemia. He made the interesting observation that with the exception of two patients, all of the toxemias weighed between 160 and 240 pounds. Toxemia and eclampsia occur nearly fifty times more frequently in diabetics according to White.<sup>7</sup> Fifty per cent of the cases studied by Potter and Adair<sup>8</sup> were toxemias. Mengert and Laughlin<sup>9</sup> found that 24 per cent of their cases were pre-eclamptics. In our series there were twelve cases of pre-eclamptic toxemia, an incidence of 27 per cent. No cases of eclampsia occurred. Three of the seven stillborn infants were from pre-eclamptic patients.

Hydramnios is mentioned in the literature as one of the complications of diabetic pregnancies. It has been suggested that better control of the diabetes may account for a decrease in the number of cases of hydramnios. We have had one case of hydramnios in our group of patients

There were no cases of diabetic coma during labor or during the puerperium; however, two cases of hypoglycemia due to excessive dosage of insulin did occur. Both of these occurred during the puerperium.

It is generally believed that puerperal sepsis is rare in the diabetic. This is borne out in this series in that only three patients delivered per vaginam, demonstrated a post-partum morbidity (10 per cent of the vaginal deliveries) and in none of these was the morbidity severe. The morbidity incidence in the cases delivered by section was 43 per cent which is not considered high for this type of operation. There were no wound complications of significance.

There were two cases of maternal mortality. Both of these patients died of pneumonitis following aspiration of vomitus at the time of section. In neither of these sections was diabetes the indication for op-

eration

Stander and Peckham<sup>10</sup> and others have pointed out that some diabetics improve during the latter part of their pregnancies. It is believed by some that this is due to an increased supply of insulin from the fetus. Excess ultilization of maternal carbohydrates has also been considered. Although this change for the better does take place in some cases, it is probably not the rule. Reuter<sup>11</sup> states that about 10 per cent improve, 40 per cent show no change and 50 per cent become worse. As regards the status of the infant pancreas in maternal carbohydrate metabolism, the recent work of Helwig<sup>12</sup> is noteworthy. In a study of eighteen fetal pancreases, nine of which were from children born of diabetic mothers, it was concluded that although in general there was an hypertrophy and hyperplasia of the insular tissue in the infants of the diabetic group, this finding was not constant, nor was there a correlation between the amount of insular tissue and the blood sugar level of the infant. Potter, Seckel and Stryker<sup>13</sup> are of this same opinion.

During the early months of pregnancy abortion occurs frequently. This is particularly true in cases of uncontrolled diabetes in which cases abortions are said to be six times more frequent than in the controlled patients.<sup>7</sup> Ronsheim<sup>17</sup> estimates that 50 per cent of diabetic pregnancies end in abortion or premature birth. Acidosis, poorly understood changes in the reproductive system,<sup>18</sup> failure of the normal glycogen deposition in the diabetic endometrium<sup>7</sup> are the most favored attempts

to explain these early mishaps in diabetic pregnancies.

Any report on diabetes associated with pregnancy would be incomplete should mention of the work of Smith and Smith<sup>4</sup> be omitted. These investigators found an imbalance between prolan and estrin levels

in pre-eclampsia. They also observed a close relationship between this abnormal hormone picture and late accidents of the pregnant diabetic, i.e., toxemia and stillbirths. Similar studies on pre-eclamptic patients have been made by Taylor and Scadron. Their observations, however, failed to substantiate the Smiths' conclusions.

White, Titus, Joslin and Hunt, <sup>15</sup> basing a therapeutic approach to the problem on the work of Smith and Smith, have instituted substitutional therapy with massive dosage of estrogenic hormone and progestin. In their hands this has given remarkable results in controlling pre-eclampsia, stillbirths and excessively large babies. Stilbestrol in doses of 40 to 120 milligrams has been used in place of the natural estrogens with equally spectacular results. <sup>16</sup>

Methods of delivery of the diabetic vary greatly. 9, 19-24 We are of the opinion that individualization of cases is of greatest importance, and because of this belief, the methods employed in this clinic can be classified as a group as being neither conservative nor radical. Delivery by vaginal route was affected in 68 per cent of the cases presented, however, no hesitancy is felt in selecting section as the method of choice in certain cases. Fourteen (32 per cent) of our cases were delivered by cesarean section. Four of the sections, however, were done because of conditions other than diabetes. These indications were placenta previa, premature separation of the placenta, failure of the fetal head to enter the pelvis following thirty-one hours of labor, and a previous section.

Induction of labor is done infrequently in this clinic except on rather strict medical or obstetrical indications. It is believed that the infant of a diabetic mother will not tolerate a prolonged labor as well as the infant of a normal patient. Since the labors following induction are not infrequently prolonged, we are of the opinion that this method of bringing about premature labor to avert intrauterine death which may take place close to term is of use in a very selected number of cases. In four of our cases labor was induced. These four cases were multiparas and three were delivered of living babies. In the fourth case, the fetus was dead prior to induction of labor.

We are in agreement with R. S. Titus<sup>23</sup> in that the child is of such importance to some of these diabetic mothers that cesarean section cannot be considered a radical procedure for terminating their pregnancies prematurely and increasing their chances of having a living baby. The indications for cesarean section in diabetic patients may be listed as follows: (1) Purely obstetrical, e.g., cephalopelvic disproportion, placenta previa, etc.; (2) patients with viable babies in whom there are progressive elevations of blood pressure or other signs of increasing precedampsia; (3) certain cases in which there have been previous still-births which were attributed to diabetes; (4) elderly primigravidas; (5) any case in which the delivery of a living infant is of great importance to the patient; and (6) the occasional case in which the diabetes becomes uncontrollable with the advancement of pregnancy and the baby is viable.

In cases in which section is done on fetal indications, the time for operation should be about three weeks before the expected date of confinement. Most infants of diabetics will be found to be mature at this age. X-rays may be of value in determining the size of the fetus, this being used as a guide to the time for delivery. This procedure must be correlated with the menstrual history of the patient and clinical judgment and not solely relied upon as an index of viability.

When an artificial termination of pregnancy, section or induction, is decided upon, it must be kept in mind that the size of the fetus of a diabetic is not an infallible criterion to the maturity of the infant. Titus<sup>23</sup> cites two cases in which the infants of diabetic patients, delivered by section, died of prematurity. These infants weighed 3,456 grams and 3,870 grams.

We wish to emphasize that performing a section simply because a tubal sterilization is to be done is not a sound obstetric procedure. A sterilizating operation can be done in the early puerperium with a negligible risk to the patient, and if it is done at this time, it is an extremely simple operation.

## Summary and Conclusions

Forty-four diabetic pregnancies delivered in the University Hospitals of Cleveland during the past eleven years are presented. Our statistics are in general agreement with most of those of others in the recent literature as regards fetal and maternal complications.

Whereas we do not sanction delivery by cesarean section in every diabetic pregnancy, we consider this method of delivery preferable in many eases. The indications for cesarean section in diabetic pregnancies are outlined.

Careful study and individualization of cases offer the best hope for assuring pregnant diabetics of successful terminations of their gesta-

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### THECA-CELL TUMORS OF THE OVARY

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A LTHOUGH fibromatous ovarian tumors associated with menstrual irregularities or postmenopausal bleeding had been reported previouly in the scientific literature, it was not until 1932 when Loeffler and Priesel¹ presented six cases of "fibroma theca cellulare xanthomatodes ovarii" that gynecologists and pathologists recognized a new clinical entity. This report sent many gynecologic pathologists scurrying to their laboratory files, with the result that a number of ovarian tumors previously diagnosed as fibromas were reclassified as theca-cell tumors.

To date, a total of approximately 82<sup>1-39</sup> such tumors have been reported in the world literature. There have also been a number of other tumors reported which, though not classified as theea-cell tumors, would seemingly fall into this group from the data presented.<sup>40-42</sup> In addition, Traut and Marchetti<sup>43</sup> have reported a series of 54 tumors, four of which were thought to be pure thecomas, one a pure granulosa-cell tumor, and 49 a general admixture of both types.

In recent years, Geist and Gaines,<sup>12</sup> Dockerty,<sup>21</sup> Wolfe and Neigus,<sup>24</sup> Henderson,<sup>28</sup> and Novak<sup>45</sup> have made substantial additions to the literature regarding this gynecologic entity.

## Histogenesis

The origin of theca-cell tumor is a subject of considerable controversy. Novak<sup>45</sup> states that the tumor is derived from embryonic ovarian mesenchyme, having a common origin with the granulosa-cell tumor of which he considers the theca-cell tumor to be a subdivision. This view has been supported by Greenhill and Greenblatt; <sup>14</sup> Traut, Kuder, and Cadden; <sup>18</sup> and Fallas. <sup>27</sup>

Geist<sup>44</sup> maintained that the theca-cell tumor is derived from the unused and immature theca cells of the ovarian parenchyma, and therefore is a separate entity from the granulosa-cell tumor. Dockerty<sup>21</sup> likewise adheres to this theory.

It is not within the limits of this paper to attempt a settlement of these two opposing views.

#### Clinical Features

Sixty-five per cent of theca-cell tumors occur after the menopause, and thirty-five per cent occur in the period between puberty and the climacterium. The tumor has never yet been demonstrated in children.

Development of theca-cell tumors during the years of normal sexual activity generally results in menorrhagia, often preceded or succeeded

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by a period of hypomenorrhea or amenorrhea. Not infrequently, there are no menstrual abnormalities noted. Varying degrees of virilism have been reported in three instances previously.  $^{12, 17, 22}$ 

Atypical bleeding is the most prominent symptom in post-menopausal patients. The bleeding may be cyclic or irregular, scanty or profuse. Other changes noted are a rejuvenation of atrophic breast tissue, recrudescence of libido, and a revitalization of the vaginal mucosa.

Physiologically, because of the hyperestrinism produced by the tumor, the uterus becomes enlarged and softened, with a glandular cystic or adenomatoid hyperplasia of the endometrium.

All symptoms abate upon extirpation of the tumor. In the premenopausal group, the periods again recur regularly; in the postmenopausal group, the bleeding ceases.

## Pathology

The tumor is always unilateral, no bilateral theca-cell tumors ever having been reported. Thecoma tends to simulate the fibroma of the ovary in size, shape, and consistency. A capsule is commonly present. On cut section, the surface is noted to be composed of varying-sized islands having a diagnostic yellow hue and separated by grayish-white fibrous bands. Small cystic areas are an inconstant feature and result from liquefaction necrosis.

Histologically, the tumor is composed of interlacing fasiculi of connective tissue scattered through which are nests of polygonal or large spindle cells having an epithelioid appearance. These latter cells have a dark staining protoplasm and oval-shaped or elongated nuclei which are eccentrically situated. Intercellular and intracellular lipoid is a characteristic feature. Hyaline plaques in the interstitial matrix are also commonly observed.

## Material

In the study of 176 ovarian tumors removed surgically on the Kings County division at Kings County Hospital since January 1, 1935, there were 33 solid tumors of which 3 were thecomas. Other dysontogenetic tumors observed in this series were 4 granulosa-cell tumors, 2 disgerminomas, and one luteoma. One theca-cell tumor in our series was discovered incidentally at autopsy.

All our specimens were fixed in formalin immediately after removal, a fact which has precluded their study for hormonal content. The clinical and histopathological data are sufficiently interesting, however, to warrant the report of these cases.

#### Case Reports

Case 1.—The patient, a white, unmarried, 17-year-old female, entered on June 7, 1942 because of a progressive enlargement of an abdominal tumor mass, first noted by her 15 months before. The mass had caused no symptoms other than a swelling of the left lower extremity for 2 weeks before admission. There had been no menstrual irregularities. Her menses had begun at the age of 12, and recurred regularly every 30 days, lasting 4 to 5 days. The last menstrual period had begun May 30, ending June 4. She had noted a 12-pound weight gain during the preceding year.

On examination, no change was noted in the secondary sex characteristics except that the breasts were small and poorly developed. The abdomen contained a very firm, ovoid mass, the size of a full-term gravid uterus, which seemed to almost completely fill the pelvic and abdominal cavities. There was more fullness in the left flank than in the right. A bruit was auscultable in the right lower quadrant. On rectal examination, the uterus and adnexa could not be made out.

On June 15, through a midline incision from the xiphoid process to the symphysis pubis, the right tube and a huge solid tumor which had completely replaced the right ovary were removed. The tumor measured 30 by 25 by 18 centimeters and weighed 5,380 grams (12½ pounds). The uterus and left adnexa appeared normal. A slight amount of clear

free fluid was noted in the peritoneal cavity.

Convalescence was uneventful, and the patient was discharged on June 28, 1942.

Since her operation, the patient has maintained good health. Her periods have been regular every 30 days. She has become more feminine in appearance. The breasts have become more developed and full.

Pathologic report: On section, the tumor was found to be completely encapsulated. Cut surface of the tumor was firm and grayish-pink in color, with focal areas of yellow tissue separated by white fibrous bands.

Microscopic examination revealed ovarian tissue being replaced by a neoplasm made up of bundles and strands of interlacing connective tissue. The individual tumor cells varied from a plump ovoid type to a more elongated and flattened spindle-cell type. Special stains showed intra- and extra-cellular lipoid in large amounts.

The histopathologic diagnosis was thecoma of the ovary.

Case 2.—The patient, a 43-year-old colored laundress was admitted on July 17, 1943. One week before admission, she had developed a sharp cramping pain in the left epigastrium, which after 2 days localized in the right inguinal region as a dull, constant ache. There had been no nausea or vomiting. There had been no menstrual irregularities. Her last period two weeks before admission had been normal in all respects. Menses had begun at 13, recurred every 28 days for 4 days. There was no dysmenorrhea. The patient had 1 living daughter, 27 years old. A second pregnancy in 1925 had terminated spontaneously in an abortion at 3 months' gestation.

Physical examination on admission was essentially negative except for moderate tenderness in the right inguinal region, just above Poupart's ligament. No rigidity was present. An irregular mass was palpable, rising out of the pelvis.

On pelvic examination, motion of the cervix caused pain in the lower abdomen. The uterus was irregularly enlarged to 4 months' gravidity, firm, drawn to the right, anterior, tender to palpation, and somewhat fixed to motion. Both fornices seemed indurated and tender to palpation.

The clinical impression was myomata uteri with chronic pelvic inflammatory disease.

At operation on July 23, the small bowel showed acute congestion, edema, and some exudate; and the loops were intimately adherent to each other and to the omentum which was also acutely congested. The appendix, which was in the center of the congested area, also showed acute congestion. The left ovary was completely replaced by an orange-sized,

moderately firm tumor, the pedicle of which was twisted two complete turns. The tumor on cut section showed cystic degeneration with focal areas of infarction. Several islands of yellowish-white tissue were noted. The right ovary contained a small firm nodule,  $2\frac{1}{2}$  centimeters in diameter, which on cut section appeared composed of whorls of white fibrous tissue. The uterus was the seat of intramural and subserous fibroid tumors.

A supravaginal hysterectomy and bilateral salpingo-oophorectomy were performed. An appendectomy and partial omentectomy were also completed.

Postoperative convalescence was uneventful, and the patient was discharged on the twelfth postoperative day. Except for menopausal symptoms, her general health has since remained good.

Microscopic study of sections of the left ovary showed a neoplasm composed of elongated and plump spindle cells growing diffusely and arranged in bundles. In many areas, the tumor was loosely textured. Many of the cells showed vesiculation, with the cytoplasm and also the interstitial matrix showing vacuolization and clear spaces. Numerous varying-sized cysts and areas of interstitial hemorrhage were scattered throughout. Sudan III stains revealed numerous collections of lipoid scattered intra- and extra-cellularly. The endometrium appeared in the late proliferative phase of the menstrual cycle.

Final histopathologic diagnosis was thecoma of the left ovary with focal hemorrhagic infarction, fibroma of the right ovary, myomata uteri, salpingitis isthmica nodosa, and chronic appendicitis with acute peritoneal reaction.

Case 3.—The patient was a 52-year-old white housewife who had been under treatment of a local physician for one year for menopausal symptoms. Her periods had been recurring irregularly during this time. She was admitted to Kings County Hospital on January 27, 1941 because of mental confusion and disorientation of 4 days' duration. Signs and symptoms were those of cerebral damage due to multiple vascular lesions. Treatment was supportive, but the course was rapidly downhill and the patient expired on February 26, 1941.

Autopsy revealed a meningioma of the left frontal lobe, generalized arteriosclerosis, and medullary fibrosis of the kidneys.

An incidental finding of an encapsulated tumor mass,  $1\frac{1}{2}$  centimeters in diameter, was noted in the medullary portion of one ovary. Microscopically, this tumor was composed of broad spindle-cells distributed in an irregular, interlacing fashion. Sudan III stains revealed intra- and extra-cellular lipoid in considerable amounts. Foote silver stains and van Giesen stains confirmed the diagnosis of thecoma. Endometrial sections were not available, although several small intramural myomas were noted in the uterus.

Case 4.—The patient, a 52-year-old Negro widow, entered the hospital on October 6, 1943 with the chief complaint of vaginal bleeding. The patient had been amenorrheic since her menopause in 1940, except for the appearance of a profuse, painless vaginal bleeding 3 weeks before admission, which persisted. She had borne one child. Menses had recurred regularly every 28 days prior to onset of her menopause.

Pelvie examination revealed a short firm cervix with an irregularly enlarged and nodular uterus filling the pelvis.

A supravaginal hysterectomy and right salpingo-oophorectomy were performed on October 13 for myomata uteri and a right ovarian tumor. Left ovary and tube appeared normal grossly. Attached to the median pole of the right ovary by a short pedicle was a soft, rubbery, walnut-sized, yellowish-tan nodule. Section of this revealed a homogenous yellow, glistening surface. Section of the uterus revealed numerous intramural and subserous fibroids with one small submucous nodule in the fundus showing degenerative changes.

Postoperative course was uneventful, and the patient was discharged on the tenth postoperative day. General health has remained good

since operation.

Microscopic study of the tumor revealed a neoplasm composed of elongated and plump spindle-shaped cells, showing a striking tendency to be arranged in bundles and whorls, the former frequently interlacing with one another in an irregular fashion. In many instances the cells showed vesiculation, with the nucleus eccentrically displaced. In some instances, the cells appeared to be ovoid or spheroidal and epithelial-like in nature, having a scanty or clear cytoplasm. The tumor for the most part was compact and solid, although occasional areas were noted where the stroma was light textured and reticulum-like, with the cells stellate in type. With the van Giesen stain, the neoplasm seemed to be composed predominantly of young fibroblastic tissue and collagen fibrils. With Sudan III stain, a large quantity of fat was seen throughout the tumor, located both intra- and extra-cellularly in the form of globules and droplets.

The endometrium showed moderate hyperplastic changes with occasional fibroblastic changes and round-cell infiltration. In some areas the glands were dilated and cystic in type. One area proved to be a submucosal fibromyomatous neoplasm which had undergone extensive

superficial hemorrhagic infarction.

Final histopathologic diagnosis was myomata uteri, chronic hyperplastic endometritis, and thecoma of the right ovary.

### Discussion

In seventy-four cases collected from the literature having data sufficient for statistical purposes<sup>1-31</sup> and including our four cases, the age incidence was as follows:

15 to 19	3
20 to 29	7
30 to 39	8
40 to 49	8
50 to 59	28
60 to 69	12
70 to 79	5
80 to 89	0
90 to 95	1
Not stated	2

It is to be noted that 28, or 37.83 per cent, of these tumors occurred in the 50 to 59-year age group. Postmenopausal appearance of the tumor was noted in 64.86 per cent. Postmenopausal bleeding was present in 72.92 per cent.

The youngest patient having a thecoma was 16 years of age; the oldest was 92. The average age was 50.62 years.

The size of the theca-cell tumor presumably bears no relationship to its endocrine function. In the first case reported by us, no menstrual irregularities were noted by the patient despite the fact that the tumor was extremely large and weighed 5,380 grams, the largest yet reported. Generally, the tumors are no larger than a hen's egg, although some have been reported to attain the size of a small melon. Dockerty<sup>21</sup> reported one tumor, found incidentally at biopsy of a surgical specimen, which measured only 2 millimeters in diameter. A number of tumors ranging between 1 and 3 centimeters in diameter have been reported. Only a few large tumors have ever been reported. Voight<sup>20</sup> in 1940 reported a theca-cell tumor weighing 7 pounds (3,180 grams), also removed surgically. The tumor in this latter case produced irregular menses with scanty flow in a 36-year-old nulligravida.

Traut and Marchetti<sup>43</sup> have suggested that the endocrine activity of theca-cell tumors is lessened by lack of differentiation of the tumor, the presence of a high theca-cell content, or by senescence of the tumor in association with marked fibrosis and other degenerative changes.

In one of our cases, we found infarction of the theca-cell tumor as a result of torsion of the tumor pedicle. Torsion was also noted in 5 of 8 cases reported by Wolfe and Neigus.<sup>24</sup>

Likewise, free peritoneal fluid is occasionally observed with theca-cell tumors. We observed it in one case. A total of seven other examples have been recorded in the literature by Loeffler and Priesel,<sup>1, 2</sup> Geist and Gaines,<sup>12</sup> Donisi,<sup>19</sup> Dockerty,<sup>21</sup> and Wolfe and Neigus.<sup>24</sup> The case reported by Loeffler and Priesel proved to be a malignant thecoma with evidence of metastases. The other cases were all benign tumors, and there was no recurrence of the ascitic fluid after removal of the tumor.

Of 46 cases in the literature reporting endometrial findings, 36 showed hyperplastic changes, 32 of which were in the postmenopausal group. Atrophic endometrium was demonstrated twice, while normal endometrium was encountered 3 times. There were 5 examples of an associated endometrial carcinoma, all in the postmenopausal group. The association of carcinoma with the ca-cell tumors suggests the question of carcinogenic properties of estrin.

Of 52 cases in which a description of the uterus was given, 24 cases of theca-cell tumors of the ovary were associated with myomas of the uterus. Hypertrophy of the uterus was noted in addition in 17 cases. Adenomyosis was reported in 5 cases. There were 11 cases in which the uterus was considered normal or even smaller in size.

Theca-cell tumors have also been noted to occur in combination with other ovarian tumors, especially cysts of various types. One of our tumors was noted to be in assocation with a fibroma of the opposite ovary. Patterson and McCullagh<sup>5</sup> observed a similar instance in their patient, a 92-year-old female with a thecoma in one ovary and a fibroma, one inch in diameter, in the opposite ovary.

Geist and Gaines<sup>12</sup> stated that no relationship could be drawn, however, between theca-cell tumors and the uterine fibroids or ovarian cysts coincidentally found with them.

To date, there have been only three cases of malignant theca-cell These have been thoroughly described by Loeffler and Priesel,1 Huber,7 and Geist and Gaines.12

At the most, theca-cell tumors are a form of low-grade ovarian malignancy. Most surgeons feel that treatment need not be radical, a simple excision of the ovary being sufficient in the vast majority of cases. Theca cells are considered to be radioresistant, so that radiation therapy is generally considered to be of little or no value except for the diminution of the size of the tumor by the effect of x-ray on the fibrous tissue stromal elements.

## Summary

Four additional examples of theca-cell tumors of the ovary have been reported, three being removed surgically, one having been discovered incidental to autopsy. All the tumors were benign. One very large tumor occurred in a 17-year-old girl, producing no menstrual irregularities. One tumor associated with a fibroma of the opposite ovary showed infarction due to torsion of its pedicle. Convalescence and follow-up of the three cases have been uneventful.

A complete summary of the literature has been presented.

The authors wish to express appreciation to Dr. W. W. Hala, Director, and to Dr. Edmund R. Marino and Dr. Joseph Rini, of the department of pathology, Kings County Hospital, for the pathologic study.

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55 EIGHTH AVENUE

451 CLARKSON AVENUE

## POSTMENOPAUSAL OVARIAN CARCINOMA

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THE "silent" ovarian tumor has long been recognized as a great menace in the control of cancer by early recognition and treatment. The new growth is either discovered accidentally, in the course of a routine pelvic examination, or when the tumor becomes extensive enough to be noticed by the patient or to cause pressure symptoms, at which time it is usually beyond surgical interference. In a discussion of this subject, H. S. Crossen¹ suggested, among other things, "insistence on regular periodic pelvic examinations of patients who ask the physician to assume responsibility in regard to their health. These periodic examinations for silent ovarian carcinoma should be made every six months, instead of once yearly, which was formerly supposed to provide adequate safety." This is excellent advice. While it may require a great deal of educational propaganda to convince the average private patient as to the importance of such frequent examinations, it should not be difficult to institute such a routine among clinic patients. With a proper follow-up system, the patient can be instructed when to report, and is sent for if she fails to do so.

However, even among the members of the medical profession, the importance of these frequent examinations has as yet not been fully realized. Only too frequently a patient is discharged as cured or improved without any instructions to report to the clinic again for further observation. This is especially true of a group of patients with irregular menopausal bleeding. This type of patient is usually sent in to the hospital for a diagnostic curettage and insertion of radium. If the examination of the curettings fails to reveal any malignancy, a castration dose of radium is applied. The patient may subsequently be seen in the clinic for a few months and, if there are no further complaints, she is discharged as cured with instructions to report in case of any recurrence of bleeding or staining. But, the fact that a patient received radium treatment for benign menopausal bleeding does not insure her against the development of other pelvic pathology even in the absence of bleeding. This was brought out by Pemberton<sup>2</sup> who, in a series of 86 cases of postmenopausal ovarian malignancy, described two patients who had previously received radium for benign menopausal bleeding. Neither of these patients had any palpable ovarian pathology at the time she was treated with radium.

It was in order to further emphasize this point that it was deemed advisable to report the following case.

#### Case Report

M. R., a 56-year-old white female, was admitted to the Beth Moses Hospital on April 21, 1941, complaining of irregular vaginal staining and bleeding for the past two months. There were also occasional attacks of dizziness and a loss of eight pounds in weight.

Menses started at the age of 13, occurring every 28 to 31 days and lasting 4 to 5 days. The patient had two stillbirths, one of 7 months'

gestation 30 years previously, and one of 8 months' gestation 28 years ago. She had one normal pregnancy and delivery at term 26 years ago. Her last menstrual period was three years ago. There was no staining or bleeding until the time of her present illness.

Abdominal examination did not reveal any rigidity, tenderness or palpable masses. Vaginal examination showed a multiparous outlet. The cervix was hard, lacerated, eroded, not friable and freely movable. The uterus was slightly enlarged, anteverted and deviated to the left, movable and not tender. The adnexa could not be palpated.

A diagnosis of possible malignancy of the corpus uteri was made and a diagnostic curettage was advised. This was done on April 22, 1941. Only a small amount of tissue was obtained in spite of thorough curettement. The pathologic report was that of shreds of endometrium and myometrium with no evidence of malignancy. The patient was discharged from the hospital at the end of a week.

The bleeding and staining persisted and the patient was readmitted to the hospital on September 8, 1941. The vaginal findings were the same as on her previous admission. Another curettage was performed and 50 mg. of radium were inserted in the uterine cavity. The pathologic diagnosis of the curettings was that of cervical epithelium and myometrium. There was no evidence of malignancy.

The patient received 1,950 millicurie hours of radium. She left the hospital on September 21, 1941, in good condition. There was no further bleeding or staining and after the third monthly visit to the clinic, the patient was told to report only in case of any further complaints.

During May, 1942, the patient was readmitted to the hospital for an hemorrhoidectomy. A vaginal checkup at the time disclosed a hard lacerated cervix, a small uterus, freely movable. The adnexa could not be palpated.

The patient was not seen again until February, 1944, when she returned to the gynecologic clinic complaining of pain in the left side of the lower abdomen for the past six weeks. The pain was constant, dull in character, radiating down the left thigh and leg. She suffered from frequent and urgent micturition. She was constipated and felt bloated. There was no loss of weight. Abdominal examination showed the presence of a moderate distension but there was no evidence of fluid. An irregular, fixed mass could be felt above the symphysis, apparently arising from the pelvis. Vaginal examination revealed the presence of a hard mass filling the region of the left fornix and the posterior cul-de-sac. The cervix was hard, closed and movable. The uterus could not be felt separately from the mass. The right adnexus was hard and thickened. A diagnosis of pelvic malignancy was made with the possibility of intestinal malignancy to be excluded. She was admitted to the hospital on March 2, 1944. A radiographic study of the colon by means of a barium enema showed a spastic sigmoid with a soft tissue mass in the pelvis, which appeared extracolic.

The patient's blood pressure was 130/90. The hemoglobin was 13 mg. per 100 c.c. of blood. Red blood cells were 5,190,000; white blood cells 19,000; polymorphonuclear leucocytes 72 per cent; lymphocytes 28 per cent. Blood Wassermann and Kahn tests were negative. Blood sugar was 90 mg., and urea nitrogen was 15 mg. per 100 c.c. of blood. Repeated examinations of the urine were essentially negative.

On March 6, 1944, a laparotomy was performed under spinal anesthesia. Upon opening the peritoneal cavity the following was noted:

There was a mass, the size of a grapefruit in the left side of the pelvis, firmly adherent to the omentum, sigmoid and pelvic floor. This mass seemed to include the uterus and ovary, neither of which could be separately identified. The right ovary was enlarged, adherent to the intestines and posterior layer of the broad ligament and contained sero-sanguineous fluid. A supracervical hysterectomy and bilateral salpingo-oophorectomy were performed.

The following were the pathologic findings of the specimen, as described by Dr. A. R. Kantrowitz:



Fig. 1.—Gross specimen showing body of the uterus in the center, firmly adherent to the large left ovarian mass, and smaller right ovary.

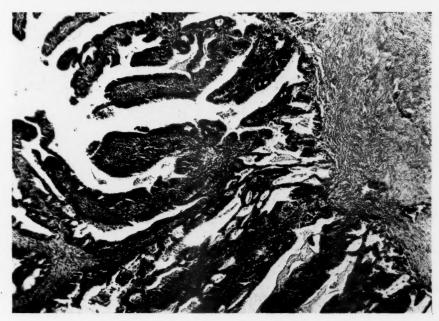


Fig. 2.—Section of left ovary consisting of papillary and glandular structures, lined by cuboidal to polyhedral cells showing marked atypism with numerous mitoses and giant cells.  $(\times 75.)$ 

Gross.—Specimen consists of a supracervically amputated uterus, together with both tubes and ovaries. The uterus is bound by dense adhesions to a large left ovarian mass. The uterus measures 6 by 7 by 5 cm. The surface is markedly roughened by the presence of numerous connective tissue tabs. The uterus is considerably distorted because of the presence of numerous masses situated within all locations. The endometrial cavity cannot be probed. Cross section reveals chocolate-brown tissue replacing the cavity completely, except in one small area at the left fundus.

The right tube measures 10 cm. in length; its fimbriated end is patent. The ovary is enlarged and measures 7 by 3 by 3.5 cm. The surface of the right tube and ovary is covered with very dense adhesions.

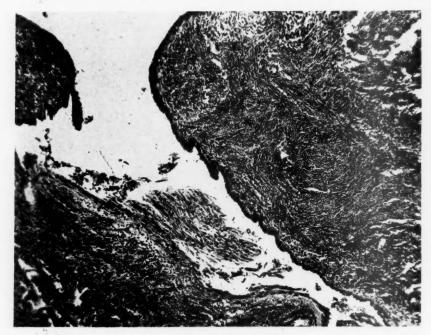


Fig. 3.—Section of uterus showing almost complete atrophy of the endometrium and its replacement by scar tissue in some areas.  $(\times 75.)$ 

The left ovarian mass measures 9 cm. in diameter. The entire mass consists of yellow tissue presenting a necrotic appearance. It is bound by dense adhesions to the uterus, the wall of which is invaded by the yellow amorphous tissue at the area of attachment.

Microscopic.—The endometrium is atrophic and the cavity, in its greatest extent, is replaced by scar tissue with pigment-laden macrophages. The myometrium is invaded by nests of atypical polyhedral cells in a

The left ovarian mass consists of papillary and glandular structures lined by cuboidal to polyhedral cells showing marked atypism with numerous mitoses and giant cells. The greater portion of the mass is completely necrotic. The cyst locules are lined by similar cells. The right ovary contains nests of identical cells.

Diagnosis: Bilateral papillary cystadenocarcinoma of the ovaries with extension to the uterus. Status after radiation of the uterus: Obliteration of the endometrial cavity; myomata of the uterus.

The patient made an uneventful recovery except for a complicating cystitis. This condition responded to sulfonamide therapy and bladder irrigations. She was discharged from the hospital on March 31, 1944, in good condition.



Fig. 4.—High power of section of uterus showing invasion of myometrium by atypical polyhedral cells. (×335.)

#### Comment

This case presents a few interesting points worthy of note. The castrating dose of radium, which was given to the patient in order to suppress the activity of the ovaries and secondarily eliminate their proliferating influence upon the endometrium, had its desired effect. This is evidenced by the atrophy and almost complete absence of the endometrium as shown in the specimen removed, and by the cessation of bleeding, clinically. However, the irradiation had no inhibiting effect upon the later development of a neoplasm in these ovaries. It is important to bear in mind the possibility of such a consequence in a postmenopausal patient who had received radium treatment for bleeding and is apparently cured. Such patients, as well as others under observation, should be examined at frequent, regular intervals for any pelvic pathology. Had the patient reported here been examined more frequently, the growth may have been discovered before it became so big, adherent to the adjacent tissues, and extended into the uterus. Surgery would have been resorted to at an earlier stage with the probability of a better prognosis.

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## LATE RECURRENCE IN CARCINOMA OF FUNDUS UTERI\*

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THIS case shows an unusual combination of treatment by radiation and complete hysterectomy in that the radiation was administered nine years and repeated four years preceding operation without any apparent impairment of the result. The patient is enjoying good health today, exactly six years after hysterectomy. The rate of five-year survival is high following total abdominal hysterectomy.

Masson¹ in a review of the Mayo Clinic cases from 1910 to 1938, found 67.5 per cent where the operation was combined with radiation and 66.6 per cent where radiation was omitted. A review of corpus carcinoma treated by radium alone reported by Fricke and Bowing² in the same institution running from 1925 to 1935 showed a five-year salvage rate of 39 per cent.

In the series of cases reported recently by Sheffey, Thudium and Farell,<sup>3</sup> their five-year salvage by operation without radiation was 36.3 per cent, and with radiation alone 40.5 per cent.

Complete operation following preliminary treatment with radium, gave these authors the higher five-year salvage rate of 42.9 per cent.

Outstanding five-year results of this combined form of therapy have been reported by Miller<sup>4</sup> 82.3 per cent, Smith<sup>5</sup> 66.2 per cent, Ward<sup>6</sup> 64.9 per cent, and Healy and Brown,<sup>7</sup> 55 per cent.

At the time this patient was radiated, she was not considered suitable for operation due to previous nephrolithiasis and recurrent pyelitis in her only remaining kidney.

These conditions had ameliorated sufficiently by the time her vaginal bleeding recurred in 1938, so that complete abdominal hysterectomy had become practicable.

In cases which fell roughly into the group of unsuitable operative risks, such as this patient was in 1929 and in 1934, radiation alone has given some interesting five-year salvage in various series, Norris and Dunne<sup>8</sup> reported 43.8 per cent, Healy and Brown,<sup>7</sup> 39 per cent and Ward,<sup>6</sup> 32 per cent.

Previous to 1938, she had been under the care of a surgeon in her home community, and was referred to me only for operation.

The history is briefly as follows:

Mrs. N. R., aged 54, white, married, admitted March 4, 1938. Chief complaint: Vaginal bleeding over a period of 10 years.

Past History: Right nephrectomy, twenty-four years previously for calculus. Left pyelotomy, seventeen years previously for calculus. Found to be hypothyroid eight months ago, and takes thyroid intermittently.

Present History: Twenty-four years before admission, following birth of last child at the age of 30, regular menstruation ceased. Nine years prior to hospitalization, i.e., in April, 1929, at the age of 42, she de-

<sup>\*</sup>Presented at a meeting of the New York Obstetrical Society, March 14, 1944.

veloped severe vaginal hemorrhages and was curetted for diagnosis, revealing a malignant adenoma. Treatment with radium, 50 mg. screened with 1 millimeter brass and 1 millimeter of rubber for 48 hours.

In July, 1934, treated again with radium for spotting. Fifty mg. as above for 24 hours. October, 1937, bleeding recurred and for past week has been profuse. She was advised to have a complete hysterectomy with bilateral salpingo-oophorectomy, which was performed March 7, 1938 under general anesthesia.

Physical Examination: Obese elderly woman. Blood pressure 140/84. Abdomen extremely obese. Small well-healed scars of bilateral renal operations. Otherwise essentially negative. Her uterus was reported as of normal size in 1929, but to have increased considerably in size by January, 1938.



Fig. 1.—Section of curettings taken in 1929, when first irradiated. Diagnosis: Adenoma malignum.

Operation: At operation considerable difficulty was encountered in getting hemostasis of left uterine artery, but transfusion was not necessary. Postoperative course was uneventful except for a recurrence of the old pyelonephritis, which subsided under medical treatment. Left hospital on sixteenth postoperative day.

Pathological Report: Uterus complete, size, 3 by 1½ by 1½ inches with both tubes and ovaries attached. Outer surface smooth. When opened, the entire fundal region is covered with an ulcerating and fungating growth about half an inch in elevation. Tubes appear small and normal. Both ovaries are sclerotic and fibrocystic in character.

Microscopic Examination: Sections of uterine wall show the surface endometrium replaced by a typical glandular overgrowth. The glands are large, irregular, tortuous and lined by elongated columnar epithe-



Fig. 2.—Curettings, 1934, irradiation for vaginal bleeding.



Fig. 3.—Curettings, 1938. Diagnosis: Adenocarcinoma of fundus uteri.

lial cells. There is moderate infiltration of the superficial endometrium. The ovaries are sclerotic and contain scattered small follicular cysts.

Diagnosis: Adenocarcinoma of fundus; sclerotic ovaries.

I am indebted to Dr. Herbert B. Gibby of Wilkes-Barre, Pa., for the details of findings and treatment before March, 1938.

130 East 56th Street

#### Discussion

DR. WILLIAM E. STUDDIFORD.—The case reported by Dr. Barrows is of interest from several points of view.

This patient ceased menstruating at the very early age of 30 and did not develop symptoms of carcinoma until she was 45 years of age, which is an early age for most cases of carcinoma of the corpus. Nevertheless, the interval between the cessation of menstruation and the time of the development of clinical symptoms of carcinoma is approximately the same as that noted in patients who usually cease to menstruate at about the age of 50.

The question arises as to whether this neoplasm represents a recurrence of the original tumor, or the appearance of a second carcinoma, possibly influenced by radiation therapy, a sequence. In favor of the latter theory is the fact that the patient was curetted midway between the two occasions when carcinoma was found and the curettings appeared to be benign, at least negative for carcinoma. On the other hand, it is a very well-known fact that radium is quite often ineffective in cases of carcinoma of the corpus and simply serves to coat the surface of the tumor with a layer of tissue which becomes hyalinized and necrotic, and this layer serves to stop bleeding and so mask the continued presence of the tumor.

I do not believe that there is very much question that the most likely explanation of the course of Dr. Barrows' case is that the original tumor must have been masked by the radiation therapy, and the patient subsequently developed further evidences of carcinoma of the corpus, resulting in her final operative treatment.

The most logical conclusion that one can draw from this case is that all patients with carcinoma of the corpus uteri treated with radiation should be subjected to total hysterectomy and bilateral salpingo-oophorectomy, provided the contraindications to such an operation are not too great. Dr. Barrows has certainly demonstrated that the contraindications to operation in this case were not too great under our present methods.

DR. HOWARD C. TAYLOR, JR.—After reading Dr. Barrows' case report several days ago, I looked up a series of cases that we had once studied which showed the intervals between the first diagnosis of carcinoma of the corpus uteri and its final operation. I found one case in the series which had a hysterectomy at 61, and had been curetted at 45. The original diagnosis in this case was papillary adenoma of the endometrium and was regarded at that time as benign. Consequently the operation had been a simple curettage. When the sections were reviewed, it was found that the original lesion had exactly the same appearance as that found sixteen years later. This then was a patient who had a curettage for adenoma malignum without radium, and finally sixteen years later had a hysterectomy for an adenoma malignum. I think it is quite possible with this type of growth for the cancer to last sixteen years without interference by radium. The point is simply that this may be a very slow growing type of tumor.

The proper treatment of carcinoma of the corpus is certainly hysterectomy if the patient can stand the operation. Dr. Barrows' case, I understand, was one which was assigned to radium because she was considered a poor risk and yet the operation was carried out 11 years later when the risk was definitely poorer. In a patient of

60 with a carcinoma of the corpus, unless her medical status is extremely bad, it is much better to take your risk then than to wait ten years more and take a much greater risk when the possibilities of radiation have been exhausted and the patient must face an inevitable hysterectomy.

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## RECURRENT TUBAL PREGNANCY IN TUBERCULOUS SALPINGITIS\*

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TUBAL pregnancy is by no means an unusual entity nor is tuberculous salpingitis. The combination of these two, however, according to Wharton and Stevenson¹ is one of the rarest combinations seen. These two authors first called attention to this in 1939 with a case report and a survey of the entire literature. They found only eight cases of proved coincidental tuberculous salpingitis and tubal pregnancy in the world literature, and reported the first case in the English literature. In addition to these cases, they found eight cases in which the gestation sac lay completely or partly free in the abdominal cavity. In three cases, the gestation sac lay cradled in the fimbria of one tube, and in five cases found the sac entirely outside the tube in the abdominal cavity. This indicates a striking incidence of abdominal pregnancy, for fifty per cent of ectopic pregnancy in the presence of tuberculous salpingitis were abdominal pregnancies. This is apparently due to failure of the fertilized ovum to enter or find nidation in the tube.

Again to emphasize the rarity of this combination, Stevenson and Wharton<sup>2</sup> stated that in 46,700 specimens submitted to their gynecologic pathologic laboratory, there were 402 cases of tuberculous salpingitis and 516 cases of tubal pregnancy, and their case was the first to combine these two entities. Bland,3 in 1940, reported that from 1928 to 1939 in the laboratory of the Jefferson Medical College, there were operated upon 193 cases of various forms of extrauterine pregnancy, or nearly 20 cases each year. None of these showed any evidence microscopically of tuberculous infection of the tubes. At the Elizabeth Steel Magee Hospital from June, 1928, to June, 1943, or a 15-year period, there were 12,841 gynecologic operative procedures. Among these, there were 32 cases of tuberculous salpingitis and 154 tubal pregnancies, but no combination of the two. There were 20,873 pathologic specimens submitted to this laboratory during this time from all services (gynecology, obstetrics and surgery) without a case of tubal pregnancy in a tuberculous tube.

Since the report by Stevenson and Wharton,<sup>2</sup> cases have been reported by Stein,<sup>4</sup> Busby and Fisher,<sup>5</sup> Bland,<sup>3</sup> and Shannon and Heller<sup>6</sup> in American journals. Rojel<sup>7</sup> and Hicks<sup>8</sup> have each reported a case in foreign journals not available. The case of Shannon and Heller<sup>6</sup> was quite unusual in that a five- to six-month intratubal gestation was found at autopsy.

<sup>\*</sup>Presented at a meeting of the Pittsburgh Obstetrical and Gynecological Society, April 3, 1944.

Wharton and Stevenson¹ have discussed the pathology in detail and offer as reasons for the infrequency of this combination the fact that tuberculosis is an invasive destructive disease with resultant (1) obstruction of lumen of the tube to any passage of any sperm or ova; (2) lack of nutrition from diseased tubal mucosa to transient fertilized ova; and (3) lack of tubal mucosa healthy enough to allow successful nidation of the fertilized ovum if it is trapped in the tube.

This case report is being presented because of the rarity of this combination of pathology and because it is, as far as I can determine, the first case in which there has been a recurrence of this unusual entity.

Mrs. C. F., 35 years old, white, was admitted to the Woman's Hospital of Pittsburgh, on November 7, 1943, at 4:00 P.M. with chief complaint of severe pain in the lower abdomen. Pain began immediately after lunch, suddenly and sharply in the lower abdomen on the left side. Nausea and vomiting were associated with this and pain has persisted with acute exacerbations. There is a feeling of pressure in the rectum and pain deep in the pelvis. Two weeks previously, patient had a similar attack but much less severe. Last menstrual period was September 12, 1943. She has missed her October period and this is the expected date of her November period. She has had slight spotting a few days ago which lasted for a few hours, but which has started again since the onset of pain. Patient began menstruating at the age of twelve, has been regular every 28 days, periods lasting four to six days. In October, 1941, patient had a ruptured tubal pregnancy on the right side which was operated upon at this hospital. Information obtained from the old chart of the microscopic examination of this tube revealed a tuberculous salpingitis in addition to the ruptured ectopic pregnancy. Patient has never had active tuberculosis that she is aware of and has never been bedfast or placed in any sanatorium. She has had x-rays of her chest, but no comment was made on this. Her family physician informed me that four to five years ago her chest had been x-rayed and old healed tuberculosis was found without any evidence of activity. Patient has been married for five years and has never had any abortions or intrauterine pregnancies. She has gained 20 pounds since her operation two years ago. Remainder of history is essentially negative.

Patient on admission appeared pale and in acute distress. Skin somewhat cold and slightly moist. Temperature 98.2° F., pulse 100, respirations 22, blood pressure, 100/60. General physical examination essentially negative. Careful examination of the chest reveals no râles or rubs. There is marked tenderness in the lower abdomen, particularly on the left side, and slight distention. There is rebound and percussion tenderness present. Peristalsis active.

External genitalia negative. Catheterized urine clear. Skene's and Bartholin's glands negative. Cervix clean. Patient is so tender on bimanual examination that no definite bimanual pelvic can be done. However, there is severe and exquisite tenderness in the cul-de-sac.

November 7, 1943, R. B. C. 3,720,000; W. B. C. 13,600; Hb. 74 per cent. Catheterized urine negative. Sedimentation rate, over 90 minutes.

Diagnosis: Ruptured tubal pregnancy, left tuberculous salpingitis. At 6 p.m. under ethylene, oxygen, local anesthesia, left salpingo-oophorectomy was performed.

The findings at operation were as follows: The left tube was markedly swollen, and in this area was a large rupture in the tube through which protruded a blood clot and placental tissue, and an intact fetus within its amniotic fluid and membrane. The fetus measured 1.5 cm. in length. There was approximately 500 c.c. of free blood in the peritoneal cavity. The left tube was attached to the broad ligament by fine fibrous adhesions; the ovary was not identified. The uterus was enlarged to about the size of a six to eight weeks' gestation, was soft and boggy in consistency and purplish in color. There were numerous small fibroids present in the uterine wall. The uterus was in second degree retroversion, and was bound to the cul-de-sac by fine fibrous adhesions. The right tube and probably the right ovary had been removed at a previous laparotomy, and were not palpated or seen. The omentum was adherent to the anterior abdominal wall at the site of previous laparotomy. In view of the patient's general condition and the amount of hemorrhage sustained, although hysterectomy was felt necessary, it was deemed inadvisable to perform it at this time.

The pathologist reported on the specimen: "tuberculous salpingitis with tubal pregnancy, corpus luteum of left ovary." Re-examination of the specimen from the previous operation revealed the same pathology.

Patient had an uneventful postoperative convalescence, the temperature never rising over 100° F., coming down to within normal limits by the seventh postoperative day and remaining so until the time of discharge.

November 18, 1943, x-ray of chest: The heart and great vessels are normal. There is a very extensive calcification throughout both upper lobes. Much of this consists of calcified nodules but there are also some flat calcified plaques on the right side which are apparently in the pleura. These changes undoubtedly represent an old tuberculosis. There is nothing suggestive of present activity.

November 11, 1943—R. B. C. 3,000,000; W. B. C. 8,800; Hb. 68 per cent.

Patient was discharged November 21, 1943, in good general condition. The wound was well healed and the patient offered no complaints.

December 28, 1943. Patient feels quite well and states that she feels much better than she has in the last few years; has gained six pounds in weight since operation; has had no vaginal bleeding. There have been no hot flushes. Abdominal wound is well healed. Pelvic examination: External genitalia negative. Cervix clean, uterus small and fixed anteriorly. There are no masses palpable in the pelvis and no tenderness. Endometrial biopsy disclosed a tuberculous endometritis.

The diagnosis in this case was not difficult as the picture of a ruptured ectopic pregnancy was quite typical. The history of a previous tuberculous salpingitis in the right side made us aware that this undoubtedly

was present also on the left side.

In view of the fact that tuberculous endometritis occurs in about 50 to 60 per cent of cases of tuberculous salpingitis, this was also felt to be a possibility. However, in view of the patient's general condition at the time of operation and the considerable technical difficulties which would have been involved in a hysterectomy, it was felt inadvisable to attempt hysterectomy. Because of the marked adhesions between the tube and ovary, the general condition of the patient, and her age, it was felt wiser to remove both tube and ovary than to attempt the somewhat tedious dissection in order to save the ovary.

Subsequent biopsy has proved that this patient has a tuberculous endometritis. However, since the patient shows definite evidence of having healed her pulmonary tuberculosis, it is quite possible that she may be able to heal the endometrial tuberculosis without necessitating further surgery. At any rate, she is to be watched very carefully in the future and is being placed under the usual medical regime for tubercu-

Note: Since the date of submission of this article, another case has been reported by Mann and Meranze, Am. J. OBST. & GYNEC. 47: 707, 1944.

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MEDICAL ARTS BUILDING

## FULL-TERM PREGNANCY AFTER REMOVAL OF REMAINING OVARY AT FIVE MONTHS OF GESTATION\*

EDWARD HOENIG, M.D., F.A.C.S., AND MARIE PICHEL WARNER, M.D., B.S., NEW YORK, N. Y.

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THIS report deals with an interesting obstetric complication, namely, a twisted pedicle ovarian cyst at fifth month of gestation followed by full-term delivery in a patient having had a previous oophorectomy. Although many major and minor operations have been successfully performed upon gravid women and pregnancy has continued, according to available literature, only 43 cases of bilateral dermoid cysts complicating pregnancy have been reported. The following case report should serve to add evidence to the belief that neither the ovary nor the corpus luteum play any role in the progress of fetal life after the fourth month of intrauterine development. It is well known, that the hormone secretions of the placenta at this stage of gestation are fully able to maintain the fetus.

## Case Report

On April 24, 1940, Mrs. B. K., aged 27, para 0, was admitted to the Jewish Memorial Hospital. The chief complaint was right-sided lower abdominal pains for two weeks prior to admission.

General and laboratory examinations were essentially negative, menstrual history normal, her last period having commenced on March 19, 1940.

Vaginal examination revealed the presence of an irregular cystic mass in the right adnexal region, and a smaller cystic mass in the left fornix. A diagnosis of bilateral ovarian cysts was made. The following day the patient was operated upon. An ovarian cyst, the size of a tangerine, five centimeters in diameter was found on the right side. The left ovary was carefully examined and found to be somewhat larger than normal, the size of a walnut. The right ovarian cyst was excised and the pathology report by Dr. A. Angrist revealed the specimen to be a cyst measuring  $4\frac{1}{2}$  cm. in diameter, covered by smooth, glistening peritoneum. On section the cyst contained sebaceous material and hair. The wall itself was rather thin. Microscopic section showed the cystic space to be lined by stratified squamous epithelium with marked keratinization and the outer lining to be of ovarian tissue. The diagnosis of dermoid cyst was made. The uterus and tubes were normal. The patient made an uneventful recovery and was discharged from the hospital two weeks after operation.

On May 21, 1941, thirteen months after the original operation, the patient was delivered by Dr. Warner of a normal, living male infant, 6 pounds, 7 ounces. It was a spontaneous delivery, L.O.A. after 7 hours of labor. A right lateral episiotomy was performed and the post partum was normal.

<sup>\*</sup>Presented before the section of Gynecology and Obstetrics at the New York Academy of Medicine, New York City, on February 28, 1944.

On January 25, 1943, twenty months after the first delivery, the patient was again admitted to the Jewish Memorial Hospital. She had become pregnant five months before admission and was now sent to the hospital because of severe intra-abdominal pain. The pains were centered about the left upper quadrant and left lumbar area, and were unrelieved by 1/2 grain of morphine. There were no uterine contractions or vaginal bleeding. Intravenous pyelography and urine examination were essentially negative. The abdomen was markedly distended, rigid, and a soft tender mass of doughy consistency could be palpated in the upper left quadrant of the abdomen. Blood examination: Hb. 84 per cent, R.B.C. 4½ million, W.B.C. 17,000, Poly. 78 per cent. Temperature was 100.8° F., pulse 84. A diagnosis of twisted ovarian cyst was made and operation advised. On opening the abdominal cavity, free straw-colored fluid escaped and the uterus was seen to be the size of five months' pregnancy. A mass, the size of a grapefruit, consisting of left tube and ovary was found in the upper left quadrant. Examination of this mass proved it to be a twisted ovarian cyst and a Fallopian tube with evidence of necrosis and gangrene in both the tube and cyst wall. The gangrenous and twisted ovarian cyst and the gangrenous tube were removed. During the entire operation, the uterus was carefully avoided.

The laboratory reported a cyst measuring ten centimeters in diameter with hemorrhage, infarction and destruction of all normal ovarian tissue. Pathologic diagnosis was torsion of pedicle with infarction and hemorrhage.

The postoperative course of the patient was uneventful, no uterine contractions were felt. No vaginal bleeding was noted and to all intents, the pregnancy continued without the presence of either ovary. Before discharge from the hospital, the patient experienced the sensations of fetal movements and on the thirteenth postoperative day, she was discharged with the pregnancy intact.

For purely empiric reasons, synthetic progesterone (proluton, by injection or pranone, oral) was administered to the patient the day following the operation. Ten milligrams by hypodermic daily for twelve days, and thirty milligrams orally were given daily for the next week and then 10 mg. until the seventh month. On May 25, 1943, exactly four months after operation, she was delivered by Dr. Warner of a six pound, four ounce normal male child. It was a spontaneous delivery and normal post partum.

#### Discussion

Owing to the acuteness of her complaints, despite the presence of a five months' pregnancy, laparotomy had to be resorted to. The necrotic and hemorrhagic condition of the remaining ovary left no choice as to the procedure—i.e., salpingo-oophorectomy. The questions of course at the time were whether operative manipulation (although uterus was not handled) and peritoneal irritation would induce uterine contractions and whether the pregnancy would continue. When the complete destruction of the only remaining gonad was disclosed, it was felt that the continuation of the pregnancy and its maintenance was already under control of the placental hormones, since it is generally accepted that with the beginning of the third month of gestation, the placenta produces increasingly large amounts of corpus luteum hormones while the production of corpus luteum hormones by the ovary rapidly di-

minishes. The administration of additional progesterone may have helped to maintain the pregnancy, but most likely the gestation would have continued even if the luteal hormones had not been administered.

The interesting point of the case is the fact that conservative surgery permitted this woman to have a second child even though at the time of giving birth, the patient possessed no ovaries. The fact that both ovaries had been totally extirpated is shown by the complete amenor-rhea since the delivery (now ten months) and the manifestations of early menopause.

### Summary

A report of a successful full-term pregnancy in a patient possessing only one ovary which had to be removed after five months of gestation is presented. The case adds evidence to the belief that neither one nor both gonads nor the corpus luteum are necessary for the continuation of pregnancy once the placental hormones are elaborated in sufficient concentration.

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## PREVENTION OF POSTOPERATIVE DISTENTION

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OSTOPERATIVE distention is a troublesome symptom that often disturbs the surgeon and patient during the first few days after celiotomy. The purpose of this report is to suggest a simple procedure which has been found to prevent its occurrence in most instances of lower abdominal surgery. This procedure is to express manually, as nearly as possible, all the air from the abdominal cavity immediately

prior to closing the parietal peritoneum.

The rationale of this supposition is that the abdominal cavity is ordinarily nonexistent or empty except for a few ounces of thin fluid and that air is forced into it by atmospheric pressure. This air must cause discomfort as is demonstrated when air is forced into the abdominal cavity in testing the patency of the Fallopian tubes (Rubin test). The amount of discomfort seems to be in proportion to the amount of gas used. Also, it was observed that patients who were delivered by extraperitoneal cesarean section often had no distention or gas pains. This is in contrast to the not uncommon occurrence of distention following the ordinary transperitoneal section. No air gets into the abdominal cavity when the extraperitoneal operation is successfully performed, as the peritoneal cavity is not entered.

In studying the general subject of pneumoperitoneum, it was found that several years ago it was used as an aid in the diagnosis of intrauterine conditions with x-ray. 1-3 It was very soon observed that by substituting carbon dioxide for oxygen or air, the untoward symptoms were diminished. Also, the patient experienced much less discomfort when a small amount of gas was used in comparison to a larger quantity. Massive inflation of the abdomen sometimes resulted in marked

distress or collapse of the patient.4

No attempt is made to control the air that gets into the abdominal cavity during peritoneoscopic examination, however, before withdrawing the instrument the air is encouraged to escape and sometimes pressure is made upon the abdomen to assist the evacuation.<sup>5</sup>

Deflation, by expressing the air from the abdominal cavity immediately prior to closing the peritoneum, was therefore tried clinically and gave almost uniformly good results which prompted this communication.

It should be emphasized that this procedure is not advocated as a preventive of ileus due to mechanical obstruction or infection. Also, it cannot be expected to have any effect on distention within the bowel or to overcome the untoward aftermath of rough handling or traumatism.

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## Department of Reviews and Abstracts

## Selected Abstracts

## Labor Complications

Kassebohm, F. A., and Schreiber, M. J.: Myometrial Mobilization, Am. J. Surg. 62: 65, 1943.

Modern tendencies in obstetrics are toward the shortening of labor and delivery. Already procedures to reduce the length of the second and third stages of labor are in common use. The authors now attempt to reduce the first stage of labor by utilizing rupture of the membranes in conjunction with pituitrin or thymophysin. They believe that the dangers associated with the use of pituitrin have been markedly exaggerated, and that "it has been blamed for much and is guilty of little."

In patients seen early in labor, or in whom labor was induced with pituitrin was used, and for those seen after the onset of labor and with cervical dilatation at a minimum of 4 to 5 cm., thymophysin. These preparations were given after rupture of the membranes at 20-minute intervals throughout the first stage until full dilatation was achieved at which time delivery was effected. The patients were carefully observed by repeated vaginal examinations. Analgesia was also employed without materially influencing the action of the oxytocics. A total of 565 cases was studied, and the average duration of labor under the above regime was 8 hours. There were no complications or accidents.

Contraindications to the method include unengamement of the presenting part, noneffacement of the cervix, or when the cervix is longer than 1.5 cm., and inadequate knowledge of the pelvic capacity and architecture.

FRANK SPIELMAN

#### Menopause

Quaranta, A. P.: Involutional or Menopausal Psychosis, An. Catedra de clin. ginec. 2: 304-306, 1943.

The influence of endocrine factors in mental illnesses is profound, but not yet thoroughly understood. The author states that, as in puberty, psychic disturbances at the climacteric may be elemental, or true psychoses. The elemental disturbances include change in ideas, character and feelings. The principal symptoms are irritability, mysticism and religious exaltation, eroticism of varying degrees, jealousy and suspicion, and hypochondria. These may be exaggerated in some cases with fixed ideas of fear and doubt, and impulsive phobias and compulsions.

A distinction may be made between a psychosis of any type that may appear at the climacteric and a true climacteric psychosis. The symptoms of the former are likely to be modified by symptoms characteristic of common menopausal emotional and mental aberrations. True climacteric psychosis is an acute condition, which exhibits itself in anxious melancholy or mental confusion in various clinical forms:

simple, delirious, hallucinatory, stuporous. This psychosis does not appear at any time during the menopause, but at a certain time and under the direct influence of a genital disturbance, such as sudden cessation of the cycle, abundant hemorrhage, or pain in the genital organs.

The most common type of psychosis seen at the climacteric is depressive, but there are also paranoid, catatonic and hysterical forms. Involutional psychosis is largely due to the following causes: a cycloid personality which may have been more or less evident; endocrine and humoral factors related to the involutional process; multiple psychogenic influences; and the vascular factor.

The prognosis is generally favorable, especially in the depressive type. Shock treatments and organotherapy have yielded satisfactory results. At times, psychotic manifestations at the menopause mark the beginning of senile or arteriosclerotic dementia.

J. P. GREENHILL

## Pineda, R.: Treatment of Surgical Menopause by Implantation of Crystalline Estrogens, An. Catedra de clin. ginec. 2: 156-204, 1943.

This subject is discussed by the author based on a study of 70 cases. Complete hysterectomy had been performed in 22, hysterectomy with unilateral adnexectomy in 16, and hysterectomy alone with preservation of the adnexa in 32.

Twenty-four patients received dipropionate of dioxidiethylstilbene in quantities of 10 to 30 mg. All were free of symptoms at the end of the first month. Twelve patients received diacetate of dioxidiethylstilbene in quantities of 10 to 20 mg. Improvement was somewhat slower but was evident in all cases by the end of a month. The nine patients who received dioxidiethylstilbene showed immediate and rapid improvement, which was attributed to the small size of the crystals, which apparently resulted in more rapid absorption. All patients in this group were free of symptoms during the second week. Estradiol dipropionate was used in 23 cases. Improvement was rapid and consistent, being complete in all cases after the third week. Dipropionate of dihydrofolliculin was used in two patients whose ovaries and tubes were preserved. Symptomatic improvement was marked after the fourth week.

Disturbances observed after implantation were of two types, local and general. Although severe symptoms of nausea, vomiting, headache, vertigo, etc., often accompany estrogen treatment orally or parenterally, these were lacking in the patients receiving implantations of crystals. It was not necessary to remove the crystals in a single instance, and the few patients who had slight symptoms generally improved within three days, and always within the first week.

There was a marked influence in many of these patients on secondary sexual characteristics. The vulva and vagina changed their appearance from that of senile atrophy to increased size and color that was distinctly noticeable. Libido returned in many patients, and some also had reappearance of the orgasm; twenty-seven patients were thus affected. There was increase in size and change in color of the breasts and mastalgia was present in a few cases. The clinical observations were controlled by vaginal smears and biopsies.

The author concludes that implantation of estrogenic crystals yields effective and lasting results. Complications and intolerance are practically nonexistent. If feasible, crystals of natural hormone should be used; it is more economical, with results as lasting or more so, and with practically no secondary effects. The effect on the symptoms of the menopause is immediate. Reappearance of libido is a fact worthy of being considered for its effectiveness. Vaginal smears reflect clearly the progress of estrogenic treatment. Optimal dosage to produce an effect lasting more than six months is about 20 mg.

J. P. GREENHILL

Alvarez, C., Geary, E., and Belizan, L.: Basal Metabolism in the Menopause, An. Catedra de clin. ginec. 2: 224-230, 1943.

The authors studied the basal rate in a group of 40 selected cases. Clinical and gynecologic investigations were carried out, as well as metabolism tests. The patients all had a natural menopause, and all the patients had menopausal symptoms severe enough to cause them to seek medical attention. It was thought that if the climacteric has an influence on basal metabolism, it would be most apparent in the group with symptoms. The symptoms for which the patients sought relief were the usual ones: dyspnea, palpitation, hypertension, headache, neuralgia, increased weight, psychic disturbances, etc.

Nine of the 40 patients had metabolic rates of more than plus 10; five, of less than minus 10; and 26 had normal rates, i.e., between minus 10 and plus 10. Clinical analysis of the nine patients with high metabolic rates showed that except for one patient with definite hyperthyroidism, all the others had hypertension, which is known to be accompanied frequently with increased basal metabolism. Only one of the patients with a low metabolic rate had an exceedingly low rate, and her menopausal symptoms did not differ from those of patients with normal rates.

An additional statistical study was made to determine the incidence of hyperthyroidism in different age groups of women. In a series of 193 cases, the incidence in patients 46 to 50 was higher than in those from 41 to 45, but not so high as in any of the groups representing five-year age periods from 21 to 40.

The authors conclude that their evidence indicates that alterations in the basal metabolism are not directly attributable to the menopause, but rather to disturbances and diseases that are coincidental.

J. P. GREENHILL

## Kurzrok, L., and Rothbart, H.: Treatment of Female Menopause With Methyl Testosterone and Stilbestrol, Am. J. Surg. 56: 636, 1942.

The authors treated 16 menopause cases both natural and surgical with methyl testosterone and stilbestrol, administered orally. In addition to the flushes, headaches, and sweats present, 3 of the patients complained of arthralgias, and 3 of pruritus vulvae. Dosage of the preparations varied; from 5 to 25 mg. of methyl testosterone was administered daily together with 2 to 3 mg. of stilbestrol. The duration of treatment was from I to 6 months. Improvement or complete relief of the menopause symptoms was obtained in all cases. Two of the 3 patients complaining of pruritus vulvae were relieved and 1 was unimproved. The 3 cases of arthralgia were improved in varying degrees. One patient showed transient lowering of the voice during therapy. No other evidence of masculinization was noted.

FRANK SPIELMAN

### Menstruation

#### Mackey, R.: Anovulatory Menstruation, M. J. Australia 1: 505, 1943.

The theories of anovulatory menstruation are reviewed. The author goes into detail in his description of the pathologic picture of the premenstrual or secretory endometrium, the presence of which is essential for the diagnosis of ovulation. The anovulatory endometrium has its own characteristic pathologic picture.

Clinically, anovulatory cycles occur at either end of the menstrual history of woman. The irregularity of the cycles at the menarche and menopause may be an indication of early and late anovular phases. The author stresses the fact that the diagnosis of anovulation cannot be made on result of one biopsy. Treatment has not

been satisfactory. The primary failure appears to be in the functional control of the anterior pituitary in ripening the follicle and causing it to rupture. Other means of treatment with hormones and x-ray have not produced the desired result.

WILLIAM BERMAN

Solomons, Edward, and Widdess, J. D. H.: The Action of Certain Antispasmodics on Uterine Muscle, Irish J. M. Sc. 216: 637, 1943.

A preliminary report is given of the effect of trasentin, penthidine hydrochlorida, and syntropan on constrictions of the human uterus. The usual rubber bag technique was used to record constrictions.

Twenty-one human patients were observed of whom 9 were suffering from dysmenorrhea. Of 13 patients treated with trasentin, 10 showed no effect, and 3 showed relaxation. Six patients were treated with penthidine. One showed relaxation, and 5 showed increased activity of the uterine muscle. Syntropan was used in only 2 cases, both of which showed relaxation.

L. M. HELLMAN

## Quaranta, A. P.: Puberal Psychosis, An. Catedra de clin. ginec. 2: 298-303, 1943.

The various types of psychopathies that appear at puberty, and sometimes continue, with reappearance of symptoms at each menstrual period, require a hyporesistant constitution for their development, according to the author. Factors which contribute to this are heredity, consanguinity, alcoholism in the parents, environmental conditions, emotional shocks, etc. Psychic disturbances in puberty range from simple neuroses to frank psychoses. Among the elemental psychoses are simple depressions with tendencies to solitude and retirement, excessive slowness, or marked timidity in contrast with the patient's previous behavior. On the other hand, some girls display excitation of varying degree, manifesting itself in excessive activity, coquetry, talkativeness, turbulence, insomnia, mischievousness, stubbornness, deceit, religious mania, etc.

When the disturbance is more serious, one observes various hysteric symptoms, neurasthenias, hypochondria related to the new sensations of menstruation, mental anorexia, obsessions, especially relating to insecurity, morals and chastity. In some patients there are certain malignant tendencies: cruelty to animals, compulsion to steal, to set fire to things and even to murder. Some want to see the world, be free, and live adventurous lives.

Pubertal psychoses may take any form, that is, any known psychosis may appear at this period, although its symptoms and development may be modified by the influences attending the patients sexual awakening. In types with delirium, this may be of erotic or religious type. Confusion may be confined to acute hallucinations, experienced chiefly at night. The type of mental confusion usually considered most common in puberty is stuporous, with acute hallucinatory crises.

The prognosis is favorable in the elemental forms, but becomes serious in generalized psychoses as well as in catatonic or hebephrenic forms, because of the tendency to schizophrenia. Improved results depend on conscientious cooperation between gynecologist and psychiatrist. Shock treatments and other modern psychiatric methods have greatly improved the outlook in these cases. In patients with mild psychic disturbances, ultimate mental health is largely dependent on the wisdom and understanding with which they are guided in sexual matters and other emotional expressions at this period.

J. P. GREENHILL.

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Rutherford, Robert N.: Physiological Intermenstrual Bleeding—Gross or Microscopic—as a Possible Diagnostic Aid in Abdominal Pain Studies, West. J. Surg. 52: 62, 1944.

Intermittent menstrual pain or Mittelschmerz was first described in 1847. In 1928, it was first observed that microscopic uterine bleeding may occur periodically between the fifteenth and nineteenth days of the menstrual cycle. This has been found to occur in 75 per cent of Rhesus monkeys at the time of ovulation. Gross bleeding is also occasionally seen in women.

Periodic intermenstrual pain associated with ovulation may be due to rupture of the follicle, chemical irritation of the adjacent tissues by the follicular fluid or related to vascular or nerve response. The author carefully follows 20 normal patients without intermenstrual pain for a period of 1 year. The patients were instructed to inject 1 ounce of saline in the vagina each morning during their estimated ovulation period and collect the washings in a bottle. These daily washings were examined microscopically for blood. When blood was found, a pelvic examination was done and an endometrial biopsy taken. In 237 cycles, microscopic blood was found in 67.9 per cent. It appeared at an average 11.7 days before the onset of the next period. The blood was usually present 3 days. Of the 20 patients studied, 17 showed microscopic bleeding in one or more cycles. On pelvic examination, 79 per cent had a sense of fullness and tenderness, and 18 per cent had definite abdominal tenderness associated with bleeding. Endometrial biopsies taken at the time of bleeding usually showed early secretory phase. There was no definite relationship with libido.

In an another series of patients with periodic pain similar findings were noted as in the above group. Many of the patients in this group presented a problem in the differential diagnosis of appendicitis and ovulation pain. It is the author's opinion that the simple technique of vaginal washings with a search for microscopic bleeding will further aid in the differential diagnosis. It may also help in dating ovulation for sterility, or contraceptive study.

WILLIAM BICKERS.

## Loeser, Alfred A.: Effect of Emotional Shock on Hormone Release and Endometrial Development, Lancet 244: 518, 1943.

The author reports four cases of suppressed menstruation due to shock. In three instances the shock or psychic trauma was due to bomb explosions, and in the other to the omission of the use of contraception.

The specimens obtained by curettage were examined by Professor Emil Novak. It is concluded in summary that "four women who had always menstruated regularly missed a period after an emotional shock. Histological examination of the biopsy specimens showed an endometrium at the stage of development it would normally have reached at the time of the shock, suggesting that the shock caused an immediate arrest of development by interruption of the release of the proper hormones."

FRED L. ADAIR.

# Morton, S., Gerson, R., and Biskind, Leonard H.: Nutritional Deficiency in the Etiology of Menorrhagia, Metrorrhagia, Cystic Mastitis, and Premenstrual Tension, Surg., Gynec. & Obst. 78: 49, 1944.

Based on two earlier observations, namely, that estrogen is inactivated in the liver, and that this inactivation cannot be accomplished in vitamin B deficient animals, the authors have made observations on 104 patients with menorrhagia, metrorrhagia, cystic mastitis, premenstrual tension, and uterine myomata. Thirty-

nine of these patients were observed primarily because they showed clinical signs of vitamin B deficiency. Of these 37 had one or more of the above-mentioned conditions, and vice versa, 52 patients whose main complaint was thought to be due to excess estrogen, showed signs and symptoms related to vitamin B avitaminosis. Many of these patients had a low level metabolic rate. Administration of thyroid without vitamin B caused an exacerbation of the signs and symptoms B avitaminosis. The particular factor of the B complex responsible for this phenomenon is not known.

L. M. HELLMAN.

Friedmann, Ernst: Prostigmin in the Treatment of the Delayed Period, Brit. M. J. 4330: 11, 1944.

The biochemical reaction of the drug on the parasympathetic control of menstruation is mentioned. The author gave 1 mg, of prostigmin intramuscularly on 3 successive days, this treatment being discontinued after the first or second injection if the menstrual flow was restored. With the exception of two cases that failed to respond, the longest interval between the last injection and the onset of menstruation was 72 hours. The side effects of the drug are described. Favourable results were obtained in 94.5 per cent of the cases of delayed period not due to pregnancy. There is no tendency of the drug to interfere with the course of pregnancy.

WILLIAM BERMAN.

#### Miscellaneous

Hartman, Carl G.: Regeneration of the Monkey Uterus After Surgical Removal of the Endometrium and Accidental Endometriosis, West. J. Surg. 52: 87, 1944.

At the Carnegie Institute, the technique for the recovery of early ova in the monkey consisted of enucleation of the entire endometrium as an intact sac. Following laparotomy, the uterus was incised longitudinally down to the endometrium and the endometrium was then dissected out with scalpel and scissors. In some experiments the exposed myometrium was then wiped clean with a cotton sponge so that no vestige of the mucosa was visible to the naked eye. These operations were followed by studies of the regenerated endometrium, and it was discovered that complete regeneration often occurs as soon as the sixteenth postoperative day. In some monkeys, castration was performed at the same time that the endometrium was removed, and under the stimulation of estrone pellet implants the regeneration in these animals was equally as rapid. Photomicrographs of regenerating endometrium were shown. The occurrence of normal pregnancies on the regenerated endometrium gives ample evidence that the uterus is able to reconstruct an endometrium which is normal anatomically and functionally.

The conclusion justifies that the regeneration of an almost completely eliminated endometrium proceeds at a very rapid rate.

In the process of removing the endometrium, it is inevitable that bits of tissue are dropped into the peritoneal cavity. Endometriosis and formation of chocolate cysts were common. However, this does not prove or disprove the Sampson theory for 2 reasons: (1) The necrotic, desquamated tissue of menstruation is less likely to transplant than the normal endometrium which was spilled in these experiments. In the experiments of Markee, it was found quite difficult to transplant menstruating endometrium to the anterior chamber of the eye while the other transplanted easily. (2) The uterotubal junction is of such a character as to make it difficult to force any liquid from the uterus to the tubes, especially during menstruation.

WILLIAM BICKERS.

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Reynolds, Philip A.: The Clinical Significance of the Rh Factor, West. J. Surg. 52: 103, 1944.

Erythroblastosis is the result of Rh antibodies in the blood of an Rh-negative mother carrying an Rh-Positive fetus in her uterus. The Rh-positive fetus results from fertilization by an Rh-positive father. However, such a potentially dangerous mating as an Rh-positive male and an Rh-negative female does not mean that all babies will have erythroblastosis. Indeed, it is known that they do not. The following reasons are given: (1) The titer of Rh antibodies in the mother, particularly in the initial pregnancy, may not rise sufficiently high to produce erythroblastosis in the fetus. (2) The Rh-positive father may be a heterozygote for the Rh factor. (3) Transfer of the fetal red blood cells across the placental site may not occur unless there is trauma from fetal movements, or the development of placental infarcts and in this case no isoimmunization will take place. However, the incidence of erythroblastosis from a mating of an Rh-positive male and an Rh-negative female is sufficiently high so that they should be warned of the potential danger.

Evidence is presented to show that repeated abortions and stillbirths without other apparent causes are most common in this type of mating. In cases of repeated abortions, the Rh factor for both man and wife should always be determined.

Severe anemias of pregnancy and the puerperium may result when an Rh-positive mother carries an Rh-negative fetus. In this case the process is reversed. The fetus produces the Rh antibodies which upon entering the maternal circulation attack the mother's red cells.

Transfusion reactions should be expected in women who have given birth to infants with erythroblastosis and those with a history of repeated abortions if they are transfused with Rh-positive blood. Isoimmunization may also occur after one transfusion so that subsequent transfusions will result in severe or fatal reactions. In transfusing an erythroblastotic infant, Rh-positive and Rh-negative blood should be alternated.

WILLIAM BICKERS.

Hartman, Carl G.: Recovery of Primate Eggs and Embryos, West. J. Surg. 52: 41, 1944.

Recovery of primate eggs and embryos for the study of mammalian development has occupied the attention of this author and his colleagues at the Carnegie Institute. A brief history of the Carnegie Institute is presented along with the evolution of knowledge relative to the development of early ova. Progress was accelerated by the ability of the investigator to raise under laboratory conditions, a large colony of Rhesus monkeys.

The author developed a technique by which ovulation in the animal could be diagnosed by rectal palpation. Following ovulation in the monkey, various techniques were employed for recovering the ova. They were obtained by aspiration of the Graafian follicle, by irrigation of the tubes following salpingectomy, by washing free ova from the uterus, by transabdominal insertion of a needle into the uterine cavity, and by irrigating the uterus with Locke's solution collecting the irrigating fluid and contents from the cervix. The most satisfactory early fertilized ova have been obtained by performing a hysterectomy soon after the established time of implantation. The uterus is removed, opened under Locke's solution. Careful histologic sections are made at the site of the chorionic vesicle. It has been shown that implantation in the monkey occurs at the beginning of the tenth day. Hertig and Rock, employing similar techniques in the human being, estimated the implantation time the seventh or eighth day. Implantation in both occurs near the midline of the ventral or dorsal surface of the uterus. The human ovum eats its

way into the decidua until completely covered by epithelium while in the monkey, the ovum remains on the surface.

Ovulation time in relation to the menstrual cycle has been adequately studied in the monkey, chimpanzee and in woman. Observations were made on the basis of rectal palpation in the monkey and study of the embryo in relationship to isolated fertile coitus in the monkey, chimpanzee and woman. The normal spread of ovulation time in the monkey is 8 to 16 days with only a few exceptions occurring on the 17, 18, 19, 29 and 23rd days. Ovulation outside of the normal range was explained on the basis of some organic disease of the ovary, or some extraneous influence which is described in detail for each case of delayed ovulation. The explanation of Rock, et al., suggests that ovulation time in the human being closely parallels that in the monkey. Only 2 per cent of monkeys ovulate outside of the defined fertile period. The functional life span of the corpus luteum in the monkey is subject to some variation while in the chimpanzee the preovulatory interval is more variable. In man, there is apparently a relatively constant postovulatory period usually about 16 days. The full truth of the above statement as regards man is yet lacking.

WILLIAM BICKERS.

#### Newborn

Bayona, E., and Gori, R. M.: Fetal Erythroblastosis, Obst. y ginec. Latino-Americanas 1: 359-364, 1943.

The following forms of erythroblastosis are recognized: Hydrops fetalis; ieterus gravis of the newborn; congenital anemia; hemorrhagic diathesis; and nonclassifiable forms without edema, anemia, icterus, or hemorrhagic diathesis, observed in the stillborn.

When a mother, who is Rh negative, carries a fetus who has inherited the Rh factor from the father, an isoimmunization of the mother is produced. Then the maternal agglutinin (anti Rh), on passing into the placental circulation, causes cellular destruction of the fetal blood and gives rise, according to its intensity, to the various clinical forms of erythroblastosis. The Rh factor, like the A and B factors of blood groups, is considered as a dominant mendelian character transmitted by a pair of genes Rh rh; the incidence of the genotype Rh Rh is 37 per cent; of Rh rh 47.6 per cent and of rh rh 15.4 per cent.

A few cases have been observed in which the Rh factor could not be demonstrated, and the authors suggest that in these, the older theory of heterospecificity of the mother should be considered. This is fundamentally similar to the theory of iso-immunization, and postulates that a mother of group O who carries a fetus of group A or B would produce agglutinins against A or B, capable of acting on the fetal blood.

Burnham believes that a maternal deficiency—even subclinical—of vitamin C may be a factor in the development of erythroblastosis.

In view of the probable cause of erythroblastosis, the diagnosis depends on studies before and after parturition. Before, the mother may present signs and symptoms which may lead to suspicion of erythroblastosis in the fetus. These include multiparity, mother Rh negative and father Rh positive; yellowish amniotic fluid, increased icterus index, erythroblastosis in previous offspring, toxemia, intrauterine death of the fetus, systolic murmur of the intrauterine fetus, etc. Radiologically, a cephalic halo can be observed in instances of hydrops fetalis, and in some instances, the fetus is in the position of Buddha, due to edema. After birth, the various types of erythroblastosis must be differentiated from physiologic icterus, hemorrhagic diseases of the newborn, congenital heart disease, congenital syphilis, absence of biliary ducts, familial acholuric icterus, Winckel's disease and hypoproteinemia.

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Blood studies are of prime importance in diagnosis, including blood group, cross-match, chemical determinations, especially of protein and uric acid, vitamins, Rh factor, etc. At autopsy, it is important to investigate deposits of hemosiderin in the fetal organs. Microscopically, there is a marked increase in osseous density in all or part of the diaphysis, and zones of rarefaction.

From the therapeutic standpoint, recognition of erythroblastosis is extremely important, in avoiding possibility of dangerous reactions from transfusion in the mother. In any suspected case, vitamin C should be administered in large doses. Interruption of the pregnancy or cesarean section should be done only with specific maternal indications. In suspected cases, analgesia and anesthesia should not be used.

Treatment of the newborn infant should be with repeated transfusions (60 c.c.) never with maternal blood. Vitamin K should be given in doses of 2 to 4 mg. Mortality and serious sequelae are reduced by these means, but unfortunately some of the children who survive have secondary manifestations, such as juvenile cirrhosis, spastic dysplegia and mental deficiency.

J. P. GREENHILL.

Torrey, John C., and Reese, Martha K.: Initial Aerobic Flora of Newborn (Pre-Mature) Infants' Nature, Source and Relation to Ultraviolet Irradiation and Face Masks, Am. J. Dis. Child. 67: 89, 1944.

This study was based on over 150 infants born in the obstetric division of New York Hospital, and were admitted, generally within one or two hours, to the unit for premature infants in the pediatric division.

Cultures were made from the throats and nasopharynges on the first, second, third and fourth days of life, and subsequently at irregular intervals until discharged, which usually occurred in three to four weeks.

The authors concluded that the initial aerobic bacterial flora of the throat and nasopharynx of artificially fed newborn infants is largely acquired through direct contact with adults and not from the parturient canal. The principal vehicle of transfer is droplets of saliva. However, on one occasion, the gonococci were found in the infants' throats and also in the maternal birth canal. Up to 16 hours after birth, the nasopharynges and throats of about 80 per cent of 16 infants exhibited sterility with the cultural methods employed.

Ultraviolet irradiation did not retard the acquisition from hemolytic streptococci, but did delay infection with the hemolytic strains of Staphylococcus aureus. Between twenty-four and forty-eight hours after birth 50 per cent of 12 infants in wards exposed to ultraviolet irradiation still showed sterility, as contrasted with 12 per cent of 16 infants in wards not so exposed. The strains of streptococci and of Staphylococcus aureus normally present in the throats and nasal passages of adults passed to some extent through the types of face masks worn, even in the absence of coughing or sneezing. The acquisition of hemolytic strains of Staphylococcus aureus was highest in the late winter and spring months and lowest in the early fall.

JAMES P. MARR.

## Pregnancy, Complications

Bonilla, J. Lopez: Tuberculosis and Pregnancy, An. Catedra de clin. ginec. 2: 307-314, 1943.

During the course of medical history, medical opinion has varied widely as to the influence of pregnancy on pulmonary tuberculosis. Attempts have been made to determine clinical forms of tuberculosis that react unfavorably to pregnancy, but no definite conclusions have emerged. Hence, it is impossible to systematize the prognosis in the tuberculous pregnant woman according to the clinical type of tuberculosis, and pregnancy does not impart any special character to the evolution of tuberculosis. A review of the most careful statistical studies, and the author's own experience leads to the opinion that there is no appreciable difference in the results of treatment for tuberculosis, whether the patient is pregnant or not. Pregnancy per se, does not exert a deleterious effect on tuberculosis, but the ultimate outcome of the disease is determined by its type and extension, and the circumstances of the individual pregnancy.

Within the first three months of pregnancy, there is one clear and definite indication for induced abortion. This is in tuberculosis which is recognized for the first time during pregnancy, with a progression that indicates it would be considered amenable to collapse therapy, but in which, because of local or general conditions, it is not possible to apply it. With this criterion, one eliminates as an indication for abortion benign types of tuberculosis whose possible exacerbation should yield to hygienic treatment and the serious types, in which collapse therapy cannot be used, and whose outlook is equally dark, with or without pregnancy.

Following this policy, the author found that abortion was necessary in only one of 18 cases in which the tuberculosis appeared with pregnancy and the patients were examined within the first three months. The patient in the exceptional instance was a primipara, aged 25, with fibrocaseous tuberculosis of the upper third of both lungs, in whom pneumothorax could not be carried out on either side. In the others, pneumothorax or phrenicectomy was performed, and the tuberculosis was controlled so that the patients were in excellent condition when they arrived at term.

J. P. GREENHILL.

Leon, J., and Lascaro, Gonzales, J. M.: Fibroma of the Ovary in a Pregnant Woman, Arch. clin. obst. y ginec. "Eliseo Cantón" 2: 287, 1943.

The authors report the case of a multipara aged 28 years, from whom a solid tumor of the ovary was removed in the third month of pregnancy. This tumor was the size of an orange and its pedicle was twisted. On its periphery was the corpus luteum of pregnancy. The tumor proved to be a fibroma. Gestation continued to term. The authors review the literature concerning solid tumors which have complicated pregnancy.

J. P. GREENHILL.

#### Erratum

In the article by Commander Phineas Bernstein, M.C., USNR, entitled "Hysterosalpingography, a Routine Aid in Gynecological Diagnosis" appearing in the August issue, page 189, the following corrections should be made in the illustrations and script:

#### Illustrations

Fig. 3 Correct title now appears under Fig. 4.

Fig. 4 Correct title now appears under Fig. 5.

Fig. 5 Correct title now appears under Fig. 6.

Fig. 6 Correct title now appears under Fig. 8.

Fig. 8 Correct title now appears under Fig. 3.

#### Script

Fig. 3 p. 192 should be omitted.

Fig. 4 p. 192 should be Fig. 3.

Fig. 5 p. 194 should be Fig. 4.

Fig. 8 p. 196 should be Fig. 6.

Fig. 3 p. 197 should be Fig. 8.

Fig. 6 p. 197 should be Fig. 5.

## Society Transactions

### NEW YORK OBSTETRICAL SOCIETY

MEETING OF MARCH 14, 1944

The following papers were presented:

Late Recurrence in Carcinoma of Fundus Uteri. David N. Barrows, M.D. (For original article, see page 422.)

A Consideration of Therapeutic Abortion. Samuel A. Cosgrove, M.D. (For original article, see page 299.)

### THE CHICAGO GYNECOLOGICAL SOCIETY

MEETING OF FEBRUARY 18, 1944

The following papers were presented:

Androgenic Therapy in Malignancies of the Female Genitalia: Preliminary Report. Stuart Abel, M.D.

Carcinoma of the Cervix and Pregnancy: A Study of Eight Cases. Alfred J. Kobak, M.D., J. E. Fitzgerald, M.D., Vincent C. Freda, M.D. (by invitation), and Louis Rudolph, M.D.

#### MEETING OF MARCH 17, 1944

The following paper was presented:

Irregular Shedding of the Endometrium, a Specific Cause of Menorrhagia. John L. McKelvey, M.D. (by invitation).

### MEETING OF APRIL 21, 1944

The following papers were presented:

A Study of Maternal Morbidity. William G. Cummings, M.D.

Statistical Analysis on Cesarean Sections at the Chicago Lying-in Hospital. Eugene G. Free, M.D. (by invitation), and William J. Dieckmann, M.D.

### MEETING OF MAY 19, 1944

The following papers were presented:

Internal Endometriosis. Harold O. Jones, M.D.

Pathology of Endometriosis. George H. Gardner, M.D.

Diagnosis of Endometriosis. Eugene A. Edwards, M.D.

Treatment of Endometriosis. Edward Allen, M.D.

## Item

## American Board of Obstetrics and Gynecology, Inc.

The annual meeting of the Board was held at Pittsburgh, Pennsylvania from June 7 to June 13, 1944, at which time ninety-five candidates were certified.

A number of changes in Board regulations and requirements were put into effect designed to aid both civilian as well as candidates in the Service. Among these is the waiver, temporarily, of our A.M.A. requirement for men in the Army or Navy, especially for those who proceeded directly or almost so from hospital services into Army or Navy Service, upon a statement of intention to join promptly upon return to civilian practice. At this meeting the Board also has accepted a period of nine months as an academic year in satisfying our requirement for certain years of training. This is only for the duration and even men who are not eligible for Military Service but who are nevertheless in hospitals where the accelerated program is in effect have been allowed to submit to us this short-time period of training in lieu of our previous requirements.

Beginning with the next written examination, which is scheduled to be held the first Saturday afternoon in February, 1945, this Board will limit the written examination to a maximum period of three hours and in submitting case records at this time, all candidates' case abstracts, whose obstetric reports do not include measurements either by calipers and, as indicated, by acceptable x-ray pelvimetry, will be considered incomplete. Prospective applicants or candidates in Military Service are urged to obtain from the Office of the Secretary, a copy of the "Record of Professional Assignments for Prospective Applicants for Certification by Specialty Boards' which will be supplied upon request. This record was compiled by the Advisory Board for Medical Specialties and is approved by the Offices of the Surgeons-General, having been recommended to the Services in a circular letter, No. 76, from the War Department Army Service Forces, and referred to as the Medical Officer's Service Record. These will enable prospective applicants and candidates to keep an accurate record of work done while in Military Service and should be submitted with the candidate's application, so that the Credentials Committee may have this information available in reviewing the application.

Applications and BULLETINS of detailed information regarding the Board requirements will be sent upon request to the Secretary's Office, 1015 Highland Building, Pittsburgh 6, Pennsylvania. Applications must be in the Office of the Secreary by November 15, 1944, ninety days in advance of the examination date. The time and place of the Spring 1945 (Part II) examination will be announced later.

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